

1979

Designing a pilot set of social accounts based on the Fox-Van Moeseke total income approach

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GHOSH, SYAMAL KUMAR
DESIGNING A PILOT SET OF SOCIAL ACCOUNTS
BASED ON THE FOX-VAN MOESEKE TOTAL INCOME
APPROACH.

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Designing a pilot set of social accounts based on the
Fox-Van Moeseke total income approach

by

Syamal Kumar Ghosh

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
DOCTOR OF PHILOSOPHY

Major: Economics

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

~~For~~ the Major Department

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For ~~the~~ Graduate College

Iowa State University
Ames, Iowa

1979

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ACKNOWLEDGEMENTS

I wish to place on record my gratitude to Karl A. Fox, my major professor, and to the members of my doctoral program committee: Arnold M. Faden, Dudley G. Lockett, Charles W. Meyer, Dennis R. Starleaf and Richard D. Warren. They have been and will continue to be a source of encouragement and enlightenment.

Karl A. Fox and Jati K. Sengupta (formerly Director of the Indian Institute of Management--Calcutta, and presently Professor of Economics at the University of California, Santa Barbara) introduced me to the world of economists. Their warmth, sincerity, and erudition have influenced my career goals. I am, indeed, thankful to them.

I owe the National Science Foundation a debt of gratitude for the research support I derived from NSF Project #SOC 76-20084 on Measurement and Valuation of Social System Outcomes under the supervision of Karl A. Fox.

I would like to thank all the other members of the faculty at Iowa State University--fellow students and friendly office personnel who made my stay pleasant and worthwhile: Diana McLaughlin, who typed my dissertation, Lois Roberts, Donna Dean and Joni Muench who have been sources of help and support all through my stay here; LaDena Bishop and Patricia Hill in the ISU Thesis Office who offered me valuable counsel during the write-up phase. Thank you all; you have meant so much to me!

My daughters, Susmita and Somali, and my wife, Champa, have to be thanked for their share in my agonies and ecstasy.

CHAPTER I. INTRODUCTION

The past two decades have witnessed an increased awareness of the need to develop meaningful social indicators and to assess the performance of social systems at all levels, from small communities to nations, in terms of these indicators. Social accounting concepts and models that would allow the recording, presentation and interpretation of social indicators, including economic and noneconomic indicators alike, are in the process of evolution. Gross [43, pp. 270-271] outlined the potentialities for developing social accounts as distinct from social indicators and pointed out that:

Above all, the maturation of social accounting concepts will take many decades. Let us remember that it took centuries for Quesnay's economic tables to mature into national income accounting. In most countries of the world, national income accounting is still at a rudimentary stage. In countries where it is highly developed, national income experts recognize that they face many conceptual problems that still require years of dedicated attention. By contrast, the formulation of national social accounts is a much more complex undertaking. It requires the participation of social scientists from many disciplines and the breaking down of many language barriers among them.

Indeed, social accounting calls for a multifaceted approach. Stone [95, p. 7], in outlining the statistical information that would be useful in the study of social conditions and social changes in their many aspects, notes that:

...the basic facts to which everything else is related are the size, composition, and change of

human population.... Advances in medical knowledge may increase the expectation of life and change the age composition of the population. The growth of education may remove considerable numbers of people from the labor force. The institutional arrangements of production and the hazards of life may lead to a highly unequal distribution of income so that poverty, while no longer the general condition, continues to exist in an otherwise plentiful world. In an attempt to deal with this problem, a variety of welfare services may be introduced. Differences in personal and family circumstances may add social to economic inequality. To varying degrees at different times and in different places, oppression, discrimination and crime are all to be found.

Stone noted that the size, growth, and density of the world's population and the aspiration for rising consumption levels call for ever-rising levels of production of goods and services and make heightened demands on the natural environment. It is not enough to know only about individuals since:

Most individuals live not on their own but in families and however they arrange themselves they give rise to households. Families differ in size, composition, ethnic origin, religion and so on, and many of these classifications apply to households too....

There are many influences that affect the conditions of life of families and their members. One of the most important is housing, including not only the physical characteristics of dwelling units, but also the neighborhoods in which they are located and the accessibility of amenities such as open spaces. Other quite different influences are: the changing pattern of the demands on time which may increase or diminish the amount of free time at the disposal of family members; the uses to which this free time is put; and the facilities and expenditures needed for its enjoyment. Yet another, quite different, influence is the availability of social security and welfare services which can alleviate various forms of human misfortune.

At the same time that individuals move through a succession of family groupings, associated with different housing conditions, enjoying more or less leisure and provided with a variety of services ministering to human welfare, they are also involved in other endeavors and other situations. In the early stages of life they are being educated; at a later stage they are engaged in economic activity; at all stages their health may be a matter of concern to them and their delinquency may be a matter of concern to others.

This is, broadly, the territory social accounting has been seeking to chart. This objective is in evidence in Thompson [99], Pyatt and Thorbecke [76], Pyatt, Roe and associates [75], Dedekam [21], Fox [29], Kendrick [54], Ruggles and Ruggles [77], Friedmann [37], Meier [67], and others.

The importance attached to inquiries in this area in recent years is reflected in the 57th Annual Report (September, 1977) of the National Bureau of Economic Research [72] which devotes more than a third of its pages to describing projects on measurement of social and economic performance and study of human behavior and social institutions.

Fox [29] reviewed the developments in the field of social indicators and social theory and developed a theoretical model that would allow one to construct social accounts based on a total income concept, which, by definition, is more exhaustive than the money income concept that has been generally used for national income accounting and which is more exhaustive than the micro accounting concepts employed in conventional accounting. Fox's approach, as will be evident from subsequent sections of this treatise, has the advantage of recognizing

and broadly accounting for noneconomic as well as economic variables.

Combining Roger G. Barker's [2] concept of behavior settings (discussed in detail in Chapter 5) and Talcott Parsons' [74] generalized media of social interchange in the framework of an exhaustive time budget covering all twenty-four hours in a day allows us to take a total systems view of the operation of a social system, be it a small community, a metropolitan or megalopolitan area, a large region, or the nation as a whole.

Fox studied the ideas of such scholars as Murray [71] and Berne [10; 11] on the hierarchical constitution of personality and those of Erikson [25] on the development of personality or character over successive life stages. He made some modifications in Parsons' list of media and defined health, value commitments, skills, and socially-validated resources (prestige, political power, power in formal organizations, rights to income from property and transfer payments) as basic categories of resources available to the individual. These resources, when used as contributions or inputs to the social system, are compensated by a flow of rewards which constitute the individual's total income.

The total income thus derived includes personal income payments (a standard concept in national income accounting) and the equivalent dollar values of rewards accruing in other media. Conventional accounts fail to capture the nonmonetary aspects. Persons who are not "gainfully employed" also receive from and contribute to the social

systems of which they are members, and this fact, too, is ignored in the conventional accounting framework.

Human behavior may be classified into broad categories such as gross motor activity, psychomotor activity, affective behavior, and the exercise of cognitive capacity. During each moment of the day each living human being is engaged in some activity. Not all activity is work-related, and the conventional market system fails to capture the impact of these nonwork-related activities. Obviously, an individual chooses his activities upon weighing the implicit and the explicit rewards therefrom. Conventional accounts, therefore, succeed in capturing only a fraction of the gross social product. The proposed system, as I will seek to demonstrate later on in this treatise, is capable of accommodating all the existing economic accounts and models whose scope is delimited by the gross national product. It can also accommodate the results of time-use surveys, behavior settings surveys, and other data relating to human behavior.

Synthesis of Roger Barker's [2] concept of behavior settings, his empirical findings for the town of Midwest, and some results from a survey of Americans' use of time made by the Survey Research Center (University of Michigan) in 1975-76 [97] contributed to the development of the Fox-Barker data set, referred to in Chapter 5, which lends itself to an approach in terms of total income. One of the major goals in the social indicators movement has been the integration of the various available data systems so as to be able to draw meaningful

policy conclusions, and Fox's approach is an effort in this direction. As Fox [29, p. 8] points out, "the success of a society in promoting human well-being must be reflected in the life experiences of its members." If we define the gross social product of a community, a region, or a nation as the sum of the rewards associated with all roles performed by all members of the society, the time flow under consideration will be 24 hours per day for every day of the year (or other accounting period) for each member.

In this dissertation an attempt has been made to trace the evolution of conventional accounting and to assess the usefulness of the information generated both at the micro-level and at the macro-level in the context of the need to develop a consistent and meaningful set of social accounts. I have attempted herein to make use of the total income approach developed by Fox and Van Moeseke and described in outline in Fox [29, pp. 8-42].

The illustrative accounts are based on data for a small community of about 1500 people in the U. S. Midwest. The choice has been dictated by the availability of data from behavior setting surveys for this community conducted under the supervision of Roger G. Barker, an outstanding social psychologist, who pioneered the field of ecological psychology and who lived in and studied this community from 1947 to 1973. Barker's survey data are uniquely suited to the exploratory purposes of this dissertation; data from census and other U. S. government publications and from a Survey Research Center (University of Michigan)

survey of Americans' use of time in 1975-76 have been used to supplement Barker's data and to link them with official statistical systems.

In addition, there are obvious advantages in experimenting with a relatively small data set before suggesting an extensive application of the total income approach.

In the concluding section of this work, an effort has been made to demonstrate that this approach can be effectively utilized for larger areas as well. Since Barker's [2] approach makes room for analyses in terms of behavior setting genotypes (groups of similar settings) in all sectors of the social system including private enterprises, government agencies, schools, churches, other voluntary associations, and households, it is possible to consider several policy relevant issues that can be handled via properly designed social accounts. But this dissertation will attempt to cover only a few of these issues and open up the field for further research.

This dissertation purports to underline the major differences between the Fox-Van Moeseke total income approach and the approach via conventional economic theory to the measurement and evaluation of social system outcomes; to examine the feasibility of preparing social accounts based on the Fox-Van Moeseke total income approach, subject to a set of simplifying assumptions; to underscore the possibility of using existing data systems and accounts, namely demographic, social and economic data and accounts; to highlight the major relative advantages in terms of analysis, interpretation, policy formulation and performance evaluation that may flow from the use of social accounts based on the

Fox-Van Moeseke model; and to comment briefly on possible further improvements, extensions and applications of this approach.

CHAPTER II. EVOLUTION OF CONVENTIONAL ACCOUNTING

In this section, I shall confine my attention to the accounting traditions in the West. It must be realized that indigenous accounting systems have existed and do exist to this day in very many parts of the world. For instance, the Volira and the Marwari system of accounts in India or the Dutch system in Europe. However, the double entry accounting concept which has evolved in the West captures the essence of accounting traditions and hence, I would restrict the discussion basically to the double-entry system.

Since the infancy of human civilization, men have been interested in the results of their economic activity--the increase or decrease of herds, stores of grains, wine, feed and fodder, stocks of metals and textiles, etc. Hoffer [46] seems to maintain the view that this kind of simple accounting was the seed-bed of written language. He goes on to say that:

...we are often told that the invention of writing in the Middle East about 3000 B. C. marked an epoch in man's career because it revolutionized the transmission of knowledge and ideas. Actually, for many centuries after the invention, writing was used solely to keep track of the intake and the outgo of treasuries and warehouses. Writing was invented not to write books, but to keep books.

Schackne [81, pp. 1-4] points out that:

Clay tablets listing the valuable objects in public treasuries and temples have been found in excavations

in Sumeria and Babylon. Payroll accounts for Roman legions, showing wages due different ranks, and deductions for equipment requisitioned still exist....

During the Middle Ages, the nobility and landed gentry employed men who could write to tabulate costs and production of estates and farms. Then, in the Renaissance with the spread of commerce and especially the organizing of maritime ventures, there was need for more sophisticated means of recording debits and credits and of determining the share of profit or loss assignable to individual participants in joint undertakings.

Pacioli [73], a Franciscan monk and mathematician, included thirty-six chapters describing a system of bookkeeping by double entry.

Shackne points out that:

Pacioli did not invent bookkeeping; many of its ideas and methods had evolved and were in use before his time. But, he was the first to bring the elements together into a coordinated system and present it in a printed work.

In the late 1700's and the early 1800's, advancing technology, the harnessing of steam power, the concept of interchangeable parts, invention of the Bessemer converter for making steel opened the way to mass production and brought on the Industrial Revolution. There was need to finance manufacture and trade on a scale never before known and this led to the devising in England of the limited company--what we in the United States call a Corporation.

The corporate form of organization made possible large aggregations of capital to do big jobs. Also, it meant more and more people put money into businesses run by others. The natural desire of investors to know how their capital was being used increased the demand for accounting information.

Indeed, the absentee-ownership issue brought into limelight by the emergence of corporate organizations signalled the distinct demand for accounting in a "stewardship" role as well as a demand for accounting in its "controllershship" role. In general, the accounting methods as we see them today in the West have originated from the British experience-- this is especially noticeable with respect to the role of the public accountant or the auditor.

There are some departures. Enthoven [24] points out that the Dutch experience with the evolution of accounting as a profession was indeed different from the British experience. Under the British tradition, also followed in principle in the United States and Canada and in most commonwealth countries and in the West, in general, the public accountant or auditor functions as an independent expert who certifies whether the accounting records, statements and other information faithfully represent the true earnings and the true state of affairs of the concern under examination, while under the system followed by the Dutch, the public accountant appears to be more intimately linked to the running of the concern under his examination.

It must be admitted here that the emphasis placed on various aspects of the role of an accountant may be different as between different countries. Readers familiar with literature on accounting case laws are probably aware of the varying degree of harshness in the sentences delivered (by a British court) in the Kingston Cotton Mills Case and (by a U. S. court) in the McKesson and Robbins Case. What

constituted a gross negligence or misfeasance on the part of a public accountant may be viewed differently in different nations, but the roles played might essentially be the same.

In the Kingston Cotton Mills Case (1896), Clive de Paula [18, p. 268] points out that:

...the accounts had been falsified to a very considerable extent by the managing director, by means of extensive over-valuations of the stock. The stock had been certified by the managing director, and it was held on appeal that the auditor was entitled to accept such certificates, and that he was not liable in respect of the dividends that had been paid out of capital as a result of the manipulation of the stock.

The Judge referred to the circumstances which led to the auditors being deceived, and came to the conclusion that they were not wanting in skill, care, or caution in accepting the figures of the manager, and he concluded as follows--

"The duties of auditors must not be rendered too onerous. Their work is responsible and laborious, and the remuneration moderate. I should be sorry to see the liability of auditors extended any further than in re The London and General Bank... Auditors must not be made liable for not tracking out ingenious and carefully laid schemes of fraud, when there is nothing to arouse their suspicion and when those frauds are perpetrated by tried servants of the company and are undetected for years by the directors. So to hold would make the position of an auditor intolerable."

From this case, therefore, it would appear that an auditor is entitled to rely upon the certificate of a responsible official as regards the stock-in-trade.

However, the decisions in the McKesson and Robbins Case (1939) were significantly different. Clive de Paula [18, pp. 283-286] notes that:

This American case arose out of the operation at the Bridgeport offices of McKesson & Robbins, Inc. of a wholly fictitious foreign crude drug business shown in the books of the Connecticut division of the corporation and McKesson & Robbins Ltd. (Canada), one of its subsidiaries.

To accomplish the deception, purchases were pretended to have been made by the McKesson companies from five Canadian vendors who were purported to retain the goods at their warehouses. Sales were pretended to have been made on McKesson's account by W. W. Smith & Co. Inc., and the goods shipped directly by the latter from Canadian warehouses to the customers. Payments for goods purchased and collections from customers were pretended to have been made by the Montreal banking firm of Manning & Co. Invoices, advices and other documents prepared on printed forms in the names of these firms were used to give an appearance of reality to these transactions.

The foreign firms to whom the goods were supposed to have been sold were real but had done no business of the type indicated by McKesson. W. W. Smith & Co. Inc., Manning & Co. and the five Canadian vendors were either entirely fictitious or merely blinds used to support the fictitious transactions.

The fraud was engineered by Frank Coster, president of the corporation; George Dietrich, assistant treasurer; Robert Dietrich, head of the shipping, receiving and warehousing department at Bridgeport; and George Venard, who managed the offices, mailing addresses, bank accounts and other activities of the dummy concerns with whom the McKesson companies supposedly did business. In reality these four men were brothers whose real name was Musica.

In 1937, the last year for which a financial statement was issued to stockholders before discovery of the fraud, fictitious sales exceeded \$18,000,000, and included in the balance sheet at 31st December, 1937, were fictitious assets amounting to some \$19,000,000. These consisted of inventories (approximately \$10,000,000), accounts receivable (approximately \$9,000,000) and bank balance

(approximately \$75,000). At the time of the exposure of the fraud in December, 1938, these fictitious assets had increased to approximately \$21,000,000.

In a summary of its findings and conclusions on the case, published in 1941, the American Securities and Exchange Commission stated that--

"INVESTIGATION OF NEW CLIENTS

The facts of this case suggest that for new and unknown clients some independent investigation should be made of the company and of its principal officers prior to undertaking the work. Such an inquiry should provide a valuable background for interpreting conditions revealed during the audit or, in extreme cases, might lead to a refusal of the engagement.

REVIEW OF THE CLIENT'S SYSTEM OF INTERNAL CHECK AND CONTROL

We are convinced by the record that the review of the system of internal check and control at the Bridgeport offices was carried out in an unsatisfactory manner. The testimony of the experts leads us to the further conclusion that this vital and basic problem of all audits for the purpose of certifying financial statements has been treated in entirely too casual a manner by many accountants. Since in examinations of financial statements of corporations whose securities are publicly owned the procedures of testing and sampling are employed in most cases, it appears to us that the necessity for a comprehensive knowledge of the client's system of internal check and control cannot be over-emphasized.

CASH

The record is clear that the work performed on this engagement by Price, Waterhouse & Co. conformed in scope to the then generally accepted standards of the profession. It is unusually clear to us that prior to this case many independent public accountants depended entirely too much upon the verification of cash as the basis for the whole auditing programme and hence as underlying proof of the authenticity of all transactions. Where, as here, during the final three years of the audit, physical contact with the operations of a major portion of the business was limited to examinations of supposed

documentary evidence of transactions carried on completely off-stage through agents unknown to the auditors save in connexion with the one engagement, it appears to us that the reliability of these agents must be established by completely independent methods. Confirmation of the bank balance under these circumstances was proven in this case to be an inadequate basis for concluding that all the transactions were authentic.

ACCOUNTS RECEIVABLE

Viewed as a whole the audit programme for accounts receivable as used by Price, Waterhouse & Co., conformed to the then generally accepted procedures for an examination of financial statements although confirmation of the accounts was not included in the programme. The facts of this case, however, demonstrate the utility of circularization and the wisdom of the profession in subsequently adopting confirmation of accounts and notes receivable as a required procedure '...wherever practicable and reasonable, and where the aggregate amount of notes and accounts receivable represents a significant proportion of the current assets or of the total assets of a concern....'

INTER-COMPANY ACCOUNTS

The record indicates that it is not enough for auditors to reconcile inter-company balances and that valuable insight into the company's manner of doing business may be gained by a review of the transactions passed through such accounts during the year. Best practice we believe requires the latter procedure. In this case the recommended procedure, although employed to some extent, was not applied in a thorough-going and penetrating manner.

INVENTORIES

Price, Waterhouse & Co.'s audit programme for the verification of inventories was essentially that which was prescribed by generally accepted auditing practice for the period. However, we find that a substantial difference of opinion existed among accountants during this time as to the extent of the auditors' duties and responsibilities in connexion with physical verification of quantities, quality and condition. Price, Waterhouse & Co., in common with a substantial portion of the profession, took the

position that the verification of quantities, quality and condition of inventories should be confined to the records. There was, however, a substantial body of equally authoritative opinion which supported the view, which we endorse, that auditors should gain physical contact with the inventory either by test counts, by observation of the inventory taking, or by a combination of these methods. Meticulous verification of the inventory was not needed in this case to discover the fraud. We are not satisfied, therefore, that even under Price, Waterhouse & Co.'s views other accountants would condone their failure to make inquiries of the employees who actually took the inventory and to determine by inspection whether there was an inventory as represented by the client. We commend the action of the profession in subsequently adopting, as normal, procedures requiring physical contact with clients' inventories.

OTHER BALANCE SHEET ACCOUNTS

(a) The testimony in respect to the auditing of plant accounts suggests that some accountants, including Price, Waterhouse & Co., could, with advantage, devote more attention to physical inspection than has been general practice with them in the past.

(b) The work in respect to liabilities was in accord with generally accepted practice, but suggests the desirability of independent inquiry when large purchases are made from a very few otherwise unknown suppliers.

(c) The record demonstrates the necessity of a thorough understanding of the client's tax situation, which apparently was not obtained by Price, Waterhouse & Co., in regard to the application of Canadian law.

PROFIT AND LOSS ACCOUNTS

We are of the opinion that such analyses of profit and loss accounts as were made were applied to improper combinations of departments, with the result that significant relationships were concealed. It is our conclusion that the independent accountant is derelict in his duty if he does not insist upon having proper analyses available for his review. It is our opinion that best practice supports this view."

Enthoven [24, p. 40] quotes Goudekot as representing the typical Dutch view which is quite different from that described above. According to Goudekot "If the auditor were to disclaim responsibility for the contents of the annual report, other than the financial statements, he would be ignoring the current trend. This would be detrimental both to his function in business society and to his duties on behalf of management."

Scott [79] points out that the Dutch have developed a comprehensive accounting philosophy which does not concern itself with the "generally accepted accounting principles" (that we consider as valid almost throughout the West) but bases its claims on what may be a rather tendentious interpretation of managerial economics.

Once again, in the socialist countries, the emphasis is different. Gambling [38] points out that in the Soviet Union planning aspects of accounting are dealt with by engineering economists while accountants are much more closely confined to financial accounting. He opines that accounting is not merely connected with the societies which it serves but rather is an integral part of the fabric of every society. He quotes Sombart ("Capitalism without double entry book-keeping is simply inconceivable") and Lenin ("Accounting and control--that is the main thing required for the smooth working, the correct functioning of the first phase of a communist society") in support of his view. One point comes out loud and clear: irrespective of the ideological framework adopted by a society, accounting has been playing a crucial role.

Some accountants would probably prefer to classify the role of an accountant in a private capacity as an employee or advisor to an individual or an organization, private or public, rendering financial accounting, cost accounting, managerial accounting, internal audit and controllership service; in a public capacity as a public accountant or auditor; in a fiduciary capacity acting on behalf of trusts; and in national and social accounting.

Whichever way we may classify the role of the accounting function, accounting has evolved as a product of the environment. Accounting has constantly changed to meet the requirements of the users of accounting information. When sole proprietorship as the most important form of business organization gave way to the partnership form of organization, or when all other forms of organization became secondary and the corporate form became the primary form of organization, the meaning and significance of accounting changed.

Scott [78, p. 276] had felt that:

Modern business enterprise could not have developed without the development of accounting upon which it depends and the further development of machinery of control over economic processes necessarily will involve corresponding advancement in accounting. In fact, accounting stands in a key position with respect to such development.

The primary function of accounting, facilitating the administration of economic activity which in turn is intertwined with social, political and cultural activity, explains the pattern of its evolution. Accounting

concepts at the micro-level have been extended to enterprise accounting (profit-making trading and/or manufacturing organizations, nonprofit-making organizations, individuals, households, etc.), government accounting, and national and social accounting.

The tasks of measurement, communication and feedback control are assigned to accounting in all kinds of social systems. For many years, with respect to enterprise accounting accountants have basically sought to answer two questions, viz., the financial position at a specific point in time and the results of the activities over a period of time in terms of income (measured in money terms). Over the years, considerable changes in attitudes have taken place and a general recognition of the desirability of designing accounting systems capable of satisfying the following kinds of informational needs is clearly visible: the informational needs of the administrators running public, private and joint sector undertakings--manufacturing and/or trading profit-making ventures and nonprofit ventures as well; the employees of such ventures in so far as they may be interested in the performance and the profit-earning capacities of such enterprises-undertakings; the investing public; and the government and all its agencies--both the judiciary and the executive branches.

At the national and at regional levels a society naturally seeks answers to the following kinds of questions: What future levels of population should be assumed for making investment decisions spanning different time horizons? What are the likely characteristics of such

projected population--in terms of age and sex distribution, household set up and changes, if any, in the composition over time; workforce--its composition and characteristics, projected lifestyles, etc.? Which spatial changes in production, distribution and consumption are likely and which ones should take place? Which regions should be allowed to grow and why? What would be the problems attendant to such growth? What levels of economic activity would likely obtain in the years to come and why? (This would imply projection of international trade and internal-interregional, intersectoral, intra-regional, intra-sectoral trade as well.) What are the possible effects of different kinds of policies and programs, state funded and privately funded? Whether there exist growth centers and if so, what course such centers would take over time? Questions such as these have been addressed by national and regional accounting.

We see instances of aggregative accounting in the works of Francois Quesnay, Pierre Boisguillebert, Sir William Petty and others. The first national income estimate was prepared in England by William Petty as early as 1665. Kendrick [53] shows that the evolution of aggregative or macro-accounting can be broadly classified into two stages or phases, the first phase running through to the World War I years when the basic reasons for research were: an urge to satisfy intellectual curiosity, a response to the spirit of nationalism and the need to build quantitative bases for analyses of proposed tax and other policies; and the second phase beginning after 1919. Research during

this period in his view has been motivated by: the need for better quantitative background for counter-cyclical policies, especially after the Great Depression,

the need for better data to meet the statistical requirements of the United Nations.

William Petty and Gregory King and their followers adopted a more comprehensive approach as compared to the restrictive approach by Adam Smith or Francois Quesnay. Petty had defined the "income of the people" as the "sum of the Annual Value of the Labor of the People" and the "Annual Proceed of the Stock or Wealth of the Nation" (comprising rent, interest and profit). This was in effect a double entry approach, since he counted the "Annual Expense of the People" or consumption outlays, both private and collective and the surplus remaining after current expenditures, which King called, the "yearly increase of Wealth."

Kendrick conjectures that, since Petty estimated current consumption in terms of a per capita average times population a value to household production over and above purchases through the markets.

The Smithian restrictive concept (that emphasis should be placed only on activity that "fixes itself" in commodities rather than on services that are consumed directly since the latter are unproductive) was, however, broader than the Physiocratic concept (which identified national income with agricultural products alone). There was opposition, however, from Lauderdale, Say, Senior, Walras, and others. In spite of the

opposition the Smithian concept stayed in the mainstream and Ricardo and John Stuart Mill were instrumental in helping perpetuate this notion. Kendrick points out that in the latter part of the nineteenth century both English and French estimators embraced the comprehensive production concept and made use of data not only from production censuses and surveys but also from income tax records and such other sources as were available to them.

Kuznets [58] defined national income in pretty much the same way as we do today; in terms of final products total, factor payments total, or as the net total of desirable events enjoyed by the individuals acting as producers and consumers. Kuznets pointed out that this is a summary and appraisal notion rather than an analytical entity. The theoretical issues he considered significant were: the definition of a nation (a) in the face of differences in the location of productive agencies, (b) in the face of differences in political allegiances and (c) in the face of differences in place of residence of owners, the choice of stage in the circulation of commodities and services at which income is to be segregated and measured, the inclusion/exclusion and the basis of evaluation of the various commodities and services that are to be added into a national total. Preliminary definitions of national income distinguish between income produced, received, consumed and enjoyed. Since enjoyment connotes subjective feelings which may vary as between different individuals comprising a nation, a region or even a small community, this concept has usually been avoided in national income estimation. Over and above this, there are certain commodities and

services to which no flow of money payments correspond, for instance, in barter transactions such as farm rent paid in kind, goods and services received gratis, and goods and services produced and consumed by the economic unit itself.

Kendrick [52] traced the pattern of evolution of national income accounting in various countries and pointed out that the United States was the fourth country in which national income estimates appeared. George Tucker (University of Virginia) wrote in 1843 on the progress of the United States in population and wealth in fifty years based on the expanded 1840 decennial census and the five previous censuses; in 1855 he added new chapters to this work based on data from the 1850 census. One of the chapters was devoted to estimates of annual income and product by commodity-producing industry and by state and another to national wealth estimates.

In the 1890's, Charles B. Spahr wrote an essay on the distribution of wealth in the United States with estimates for national income and wealth for 1880 and 1890. In 1915, Wilford I. King virtually extended the Spahr estimates to 1910.

Between the two great wars the work of national income estimation gained momentum. Whereas only 13 countries were preparing national income estimates in 1913, 33 were doing so by 1939 and the 1939 World Economic Survey (published by the League of Nations) contained comparative estimates for 26 countries covering all or part of the period 1929-1938 and about the same time the League's Committee on Statistics first took up the problem of international comparability.

The emphasis on national income accounting became pronounced as John Maynard Keynes' [55] General Theory of Employment, Interest and Money (1936) made the national product and the expenditures for the final product by the chief economic sectors central to his theory of determination of income. In the postwar years, the importance of national income accounting has been augmented by the genuine desire for economic growth and development and an assessment of the situation obtaining in that context. The United Nations published, in 1947, a treatise on the measurement of national income and the construction of social accounts and this was a help to countries interested in estimation of national income. Consistency and comparability were important issues then as much as they are now. A 1953 publication by the United Nations Statistical Office [100] on a system of national accounts and supporting tables was directed toward these ends.

The sixties and seventies have been witnessing an emphasis on the improvement of the quality of measurement, of the basic data, and the various derived estimates and toward an elaboration of basic sector accounts. This is in evidence in the proposed version of the System of National Accounts which began being circulated by the United Nations in 1965 and in Stone [95]. Efforts have been made at integrating the national income accounts with the flow of funds accounts and balance sheets as well as input-output tables.

This brief review serves to show how accounting systems at the macro-level as well evolved to meet the needs of the situation. However, even at the risk of repetition, it may be worthwhile pointing out that

national income accounting as it exists today leans heavily on micro-accounting concepts and, as such, suffers from the limitations to which the micro-accounting concepts are subject.

Although various refinements have been introduced and the degree of accuracy has improved, the national income accounts in their present form do not allow us to envision the complete working of a social system. While work-related activities and rewards are included, nonwork-related activities, which nevertheless give rise to rewards in other forms, are not included. The impact of life-styles experienced by the people in a society cannot be gauged if contributions made to and received from the society by people not classified as workers escape our attention.

Over the years, this realization has taken roots. For example, Maki and Berry [63] pointed out that the questions range from the economic and engineering to the political and social. John Friedmann [37, pp. 230-231], writing in the same volume, suggested the urgency of advancing beyond economic relationships in search of a set of social accounts worthy of the name. He pointed out that what matters most are policies that will affect primarily the noneconomic sense of well-being of the inhabitants of an area. He contends that the Gross National Product has been impressive as a convenient measure and persuasive measure of aspirations, as a quantity to which policies and programs can be related and as a theoretical framework for economic analysis and that it would be clearly impossible to construct a single composite index for regional social analysis. But, he notes the desirability

of developing measures to reflect the quality of physical environment, accessibility or the ease of movement, accommodation among social groups, social participation, safety of life, limb and property, and other conditions in addition to the preparation of the more traditional income and product accounts.

Meier [67, p. 27] also voices a similar theme:

A set of social accounts should reflect process and change in society in a quantitative manner. It should aid in highlighting the implications of alternative programs when a decision is to be made. If such accounts are to be useful, indexes must be generated which reflect human values in a form suitable for statistical aggregation. Values that are commonly held by members of the society may be inferred from numerous economic, social and cultural choices as broken down into convenient categories. The overall system should improve as the data accumulates.

The environment is ripe for the emergence of a set of comprehensive social accounts. Fox [29, Chapter I] has succinctly summarized the developments in the field of social indicators and social theory and underscored the concerns expressed about the development of meaningful social accounts. This in turn may call for new theory, new methods and new data and as always accounting will seek to respond to the challenges faced by it.

CHAPTER III. CURRENT STATE OF THE ART

Accounting Principles in Vogue

Before we focus our attention on the development of a social accounting system based on the total income approach it would be instructive to discuss briefly some of the key accounting concepts, conventions and principles which have evolved in response to the needs of the environment in which accounting has been used. Ijiri [48, Preface p. ix] noted that:

In recent years we have seen the appearance of numerous books, articles and speeches dealing with contemporary challenges to accounting from those who make growing use of electronic computers, operations research techniques, behavioral science theories, etc., in dealing with business and economic problems. In fact, accounting has now come to a critical turning point which is at least as important as the one it came to in the early 1930's.

An examination of the process of evolution of accounting and the principles and conventions in vogue becomes desirable in this context.

Wixon [111, pp. 9-10] points out that:

The recognition of the social responsibility brought with it the recognition of the need for accounting principles or standards. Considerable controversy and some confusion have existed as to the nature of an accounting principle. There are those who think that the term "principle" is too rigid to be applied to accounting since it connotes a "fundamental belief" or a "general truth." To others the significance of the term "principle" in accounting is that of a rule of action or conduct and as such accounting principles are subject to change.

The evolution of accounting principles or standards has been influenced by opinions and actions of professional bodies, government agencies and agencies like the stock exchanges and is a continuing process. Certain basic assumptions are implicit in the accounting concepts and practices. For instance:

1. The concept of the business as a separate entity. (In the case of a joint stock company, i.e., a corporation, the legal definition perfectly coincides with this assumption as the corporation is considered as a separate entity in the eyes of law, but this coincidence may not obtain for all kinds of activities.)
2. The going concern concept: It is assumed that the entity in question continues to exist. (This lies at the heart of the public's decision to invest in an economic undertaking and supports the view that "assets are unamortized costs rather than current values" [111, pp. 1-15]. This concept also strengthens the notion of earning power of an economic undertaking.)
3. The cost concept: Costs are recorded as accounting purports to express exchange transactions of an entity in money terms, money being regarded as the common denominator. The cost concept is distinct from the value concept. However, although the cost concept is in general usage, a great deal of debate has gone on and has been going on over the precise meaning of the term "cost."

Cost could mean actual or historical cost accounted for under the last-in-first-out or the first-in-first-out or the simple average or the weighted average or the moving average cost technique. It could also mean standard cost or replacement cost, etc. Lack of standardization in this regard has made comparisons very difficult. However, the concept, in general, is very closely followed.

4. Price aggregations of exchange transactions are used to represent objects and services. When a product is manufactured, for example, by transforming raw materials via a production process, the accounting records reveal the labor cost, the material cost and the overhead cost--in other words, we see an aggregation of prices paid in order to produce it.
5. Costs and revenues are matched periodically. Since an entity is conceived of as a going concern, the earning capacity of the entity assumes importance.
6. Accounting recognizes only verifiable and objective evidence, subjective and unsubstantiated evidence of any sort being discarded outright.

Since every asset is financed by a liability in some form, and every expenditure of cash or other resources is presumed to result in

acquisition of assets, goods and/or services, in some form, or payment in settlement of a liability, and every receipt of cash or other resources entails diminution of assets and/or goods and services in one form or another or the incurring of additional liability, and since the double entry system succeeds in recording both sides of each such transaction, it is recognized as a desirable accounting format. The double entry system does provide some evidence of arithmetical accuracy via the agreement of the Trial Balance and the Balance Sheet, but fails to detect errors of compensation, errors of complete omission, and errors of principle.¹ It also suffers from several other

¹ a) Errors of Compensation:

Cash received from X:	the correct entry should have been:			
\$5000			Dr.	Cr.
	Cash	Dr.	\$5000	
		To X		\$5000
Cash paid to Y:	the correct entry should have been:			
\$3000			Dr.	Cr.
	Y ...	Dr.	\$3000	
		To Cash		\$3000
Actual entries made:	Cash	Dr.	\$5000	
		To X		\$5500
	Y	Dr.	\$3500	
		To Cash		\$3000

Note that the trial balance will still match. Unless there exist an efficient system of internal check/audit or external audit and confirmation of accounts is requested from debtors and creditors, the errors may lie undetected assuming X is a debtor and Y a creditor. This would amount to an incorrect statement of both the values in the balance sheet. Several variants of this error are possible.

b) Errors of Omission:

If an entry/entries are completely omitted, i.e., not recorded either on the debit or on the credit side, the trial balance and balance sheet will match but will not reveal the true situation. Once again proper internal checks/controls/audit and external audit will likely forestall this.

c) Errors of Principle:

A provisions store acquires a refrigerator to store provisions, for

limitations resulting from the nature of assumptions and concepts used as has been pointed out by Shome and Ghosh [83], Ghosh [40; 41; 42] and others.

Ijiri [48, p. 5] points out that "financial statements of the firm" are surrogates; the principals are "the financial position and the operating results of the firm." Further, there may exist surrogates of surrogates and, "in judging the usefulness of accounting information, the perfectness of the representation rule relative to the classification that a user of accounting information wants is an important issue" [48, p. 13].

For instance, when accountants value securities for estate duty or wealth tax purposes or for the purpose of acquisition or amalgamation, they follow the net worth basis (value per security or share = total assets - external claims on the assets/number of securities) and/or the yield basis (where the security in question yields the same return as the average return in the industry in which the firm operates, the security is likely to be valued at par in the market; if it yields a higher than average return, it is likely to sell at a premium, and if it yields less than average return it is likely to sell at a

cash:

The entry that should have been made:

Actual entry made:

	Dr.	Cr.		Dr.	Cr.
Asset Account	Dr. \$2500		Miscellaneous business expenses:	Dr. \$2500	
To Cash		\$2500	To Cash		\$2500

The effect: Trial balance and balance sheet match but business expenditure is overstated and profit or income understated and assets are understated; At best, only depreciation on the machine is an expense.

discount). However, the market value of securities also depends on several other factors, such as, reputation of the board of directors, the state of employer-employee relations, the state of the economy, the technology available to the firm vis-a-vis the technology available to other firms in the industry, and so on. Hence, the user of accounting information must assess such information in terms of the classifications that he deems useful and in terms of the surrogates chosen to represent the principals he is concerned with.

It is true that the number of objects needed as surrogates depends wholly upon how finely or coarsely the principals have to be discriminated. Complaints that financial statements frequently serve as poor surrogates for the real financial position are not uncommon. Limitations of representation and measurement, and problems of valuation arising from (1) inseparability, (2) multiplicity, and (3) instability of causal networks, plague accounting [48, pp. 5-64].

In this treatise, I intend to point out that apart from these limitations, accounting fails to perform in terms of recording and communicating not merely economic information, but also social data. Ideally, an accounting system should be able to address all information needs covering both economic and noneconomic variables so as to facilitate proper policy-making and execution thereof. The macro-accounting in vogue now also suffers from a few limitations, viz.:

1. All goods and services are not really included in the national income accounts. As has been pointed out earlier in this

treatise, the output of housewives and unpaid family workers and output, in whatever form, resulting from the pursuit of hobbies or interests for which monetary rewards are not received and which are outside the purview of the market system are good examples of the goods and services excluded from the national income accounts. These accounts seek to capture the income and the product arising from the application of work-related skills that are traded in the conventional market system.

2. Thus, these accounts succeed in recording the activities for only a fraction of the living time of the various individuals in a community. Out of a 24-hour day, approximately a third is utilized for sleep and rejuvenation of the physique, less than a third is devoted to work-related activities and the rest is devoted to various other kinds of activities including recreation, personal care, etc. Under these circumstances, the conventional accounts serve to show the output and income related to only a fraction of the total living time even for those individuals whose services and rewards are under the purview of the market system.
3. Over the years, the pattern of production, distribution and consumption may shift, making interpretations of the data presented in the national income accounts difficult.
4. Comparisons over time are difficult also because what was once commercially produced and included in the national income

accounts may later be produced under nonmarket systems and may consequently be excluded from the national income accounts, and vice versa. A century ago, most of the bread consumed in the household sector of the U. S. economy was domestically produced and was excluded from the national income and product, but today the commercial bakeries have taken over pretty much the whole business and the output and the income now figure in the national accounts. Any comparison over time without prior recognition of facts such as these is apt to be greatly misleading.

5. Though the GNP is the most comprehensive measure of social performance that exists so far, it fails to reflect the state of social well-being. Societal well-being cannot be measured in economic terms alone and can be gauged to some degree by reference to facts and figures on crime rates, safety of life, limb and property (assuming that we recognize the validity of the existence of private property and the rights thereto), health and life expectancy, educational performance, and variables like social participation and mobility. Most of these are nonmarket phenomena and, consequently, the national income accounts do not allow us to consider them as closely as we would like to. It must be admitted here that an all-encompassing theory is very difficult to formulate and would certainly require communication between several

disciplines. Its creation, therefore, can truly be branded as a herculean task and one can only hope for moderate success.

6. One can easily demonstrate that a rise in the GNP per capita or a rise in the absolute GNP level is not always an indicator of progress. This is so primarily because several externalities are not properly internalized and this does not capture our attention in the national income accounts. Mishan [68, p. 171] drew our attention to the fact that: "the continual pursuit of economic growth by Western societies is more likely, on balance, to reduce rather than increase social welfare." Olson¹ comments as follows on the incompleteness of the national accounts: "But the issues cannot be dismissed: societies inevitably face a trade-off between those goals that are measured in the national accounts and those that are not, and must choose how much of one type of goods they want at the expense of the other" (p. 4). He further points out that: "One fundamental problem that has to be dealt with before the relationship of the national income and the 'quality of life' can be properly discussed is that of the relationship between externalities or collective goods and national income accounts" (p. 4). And that:

¹Mancur Olson, University of Maryland, Chapters on national income. Personal communication to Karl A. Fox, 1972.

The situation in equilibrium in a purely competitive laissez faire economy with external diseconomies is therefore as follows: businessmen produce to the point where the extra cost to them (marginal private cost) of an additional unit of output equals the price they receive for that unit of output, and emit the diseconomy whenever it makes a positive contribution, however small, to the profits of the firm. But the emission of the external diseconomy will entail psychic losses and perhaps also defensive expenditures for the victims which can sometimes be substantial. This means that the cost to the producer plus the cost to the victim of the diseconomy (the marginal social cost) of at least the last unit of output exceeds the price, or what people are willing to pay for the good. (p. 12)

Olson later on in his work points out that laundering, house repairing or painting, and similar defensive expenditures are included in the measured NNP (Net National Product) whereas the true NNP should be exclusive of such expenditures. Indeed, there appears to be good sense in also arguing with him that production for an individual's own use, individual indivisibilities, and group indivisibilities result in nonmarket activities and, as national income accounts in their present form do not accommodate nonmarket activities, these are excluded.

For instance, when we brush our own shoes, or cook our own food, these are not reflected in the economic accounts, even though market counterparts such as restaurant service or the services of shoe-shine boys exist. When a commuter gets rides from his friends and does not spend money on public transportation or does not use his own vehicle, the costs of such rides

are ignored in the accounts. The indivisibility or imperfect divisibility of the services provided by friends does not allow these services to be traded for money. A wide range of services are exchanged between husbands and wives in family units, but these relationships are personal, that is, other individuals working for market determined fees cannot replace the husbands or the wives without loss of effectiveness of the services. This is a case of group indivisibility and is not captured by economic accounts.

7. Innovations in science and in social organization may very well affect the quality of life but this may not be reflected in the GNP. There has been a significant improvement in life expectancy rates all over the world, the working hours per week are on the decline and consequently the leisure at the command of the individual has increased. These have certainly affected welfare, but the national income accounts fail to reflect this.
8. Several factors affect the choice of life-styles by the people in a community. The national income accounts do not allow us yet to comment in any meaningful manner about the quality of life.
9. In spite of concerted efforts by the United Nations, national income accounting in various countries of the world is not yet substantially standardized and consequently international comparisons may not make much sense, beyond providing a rough

and ready indicator. The purchasing power of the monetary unit in the various countries may vary, the location of production may be different, production needs may vary, depending on climate, social value judgments, etc., and there may be significant differences in styles of living as between different countries.

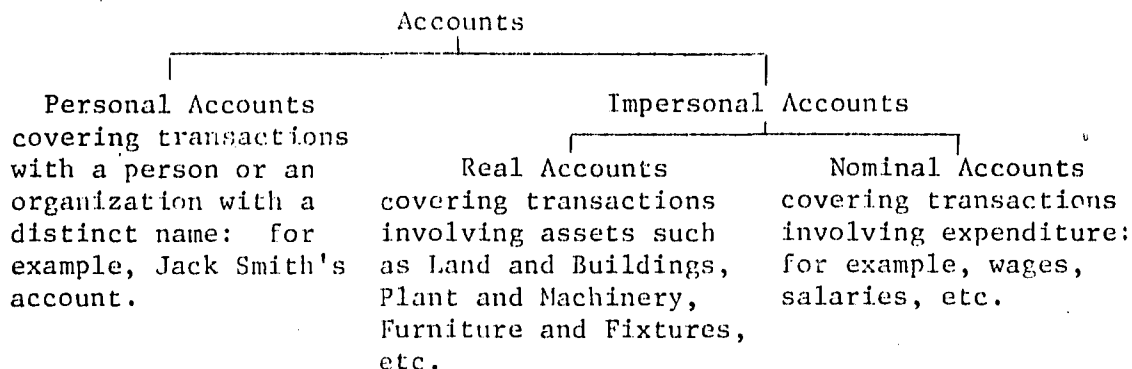
For instance, in a predominantly rural developing country, all the bread consumed may be domestically produced and excluded from national accounts whereas in an industrialized and developed country most of the bread consumed may be commercially produced and included in economic accounts. In the colder regions of the world the cost of energy consumption may be a larger fraction of the personal consumption expenditure than that in the more temperate regions, and so on.

Recognition of these limitations has led to considerable research in the area of social and demographic statistics as will be evident from the work by several outstanding economists, reported to be now in process in the National Bureau of Economic Research Bulletin (Interactions in Research, September, 1977) [72], in Stone [95], etc. In the next chapter, an endeavor will be made to describe how the Fox-Van Moeseke total income approach may be utilized in an effort to usher in an improved data system that will accommodate not only national income accounts but other indicators of social life as well.

Existing Accounting Systems

At the micro level

Accounts are classified as follows:

Accounting rules

Personal Accounts: Debit the account receiving value.

Credit the account giving value.

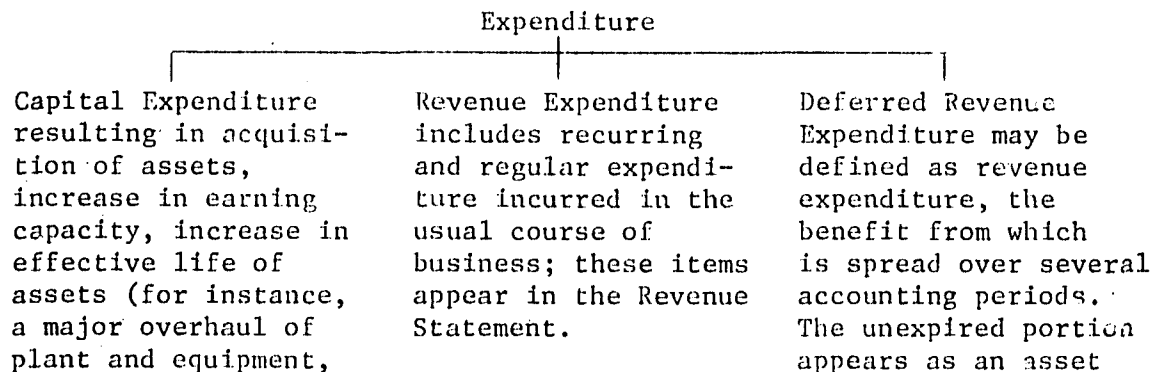
Real Accounts: Debit what comes in.

Credit what goes out.

Nominal Accounts: Debit expenses and losses.

Credit income and gains.

Expenditure is classified as follows:



which is not classified as a routine repair). These items appear in the Balance Sheet as assets at their written down values. The depreciation is considered as a noncash expenditure and written off to the Revenue statement for the period concerned.

in the Balance Sheet. The expired portion for a particular period is written off to the Revenue Statement for that period.

Likewise, receipts are also classified and recorded appropriately. There may, however, be considerable controversy about what constitutes recurring and regular expenditure in the ordinary course of business, about the method used for providing for depreciation, about the method for pricing inventory issues in a production unit (since this affects the revenue statement and consequently the taxable profit/income in appropriate cases).

Usual books of accounts and records maintained include: journal proper, daybooks and subsidiary books, ledger showing records for each account separately, and special purpose records and statements.

The format and degree of detail may vary according to the nature of business, the form of business organization, etc. For instance, in a trading business, the ledger may be divided up into (a) debtors or sold ledger, (b) creditors or bought ledger, and (c) general ledger; in a manufacturing business, ledgers may be maintained for raw materials, works general charges, and so on.

Statements and reports generated may differ from organization to organization. A distinction may, however, be made in terms of the entity's involvement in profit making or otherwise. Nonprofit organizations would usually brand their income statement as "Income and Expenditure Account" and the equivalent of net earning or result of operations as excess of revenue over expenditure (surplus) or excess of expenditure over income (deficit). In a profit-making organization, it is usual to prepare a profit and loss statement for the period under review.

Hence, the key financial statements are (a) the profit and loss statement or the income and expenditure account, and (b) the balance sheet. The balance sheet rests on the balance equation

$$A_t + F_t = L_t + N_t ,$$

where A = physical assets, F = financial assets, L = liabilities, and N = net worth; subscript t denotes a point in time.

The operation of an entity produces changes over time in the items of the balance sheet, which, in effect, shows assets as on a particular date and how they have been financed. Net change in net worth comes about as a result of operations which culminate in a profit or surplus or deficit or loss.

In principle, the double entry accounting for various entities is the same. But there may be some variants, for example, public utilities such as power companies maintain a general balance sheet and a capital

account showing long term assets and liabilities, in place of a single balance sheet containing all assets and liabilities.

Government accounting follows a somewhat different pattern mainly because (a) government units are concerned with supplying general public services (b) which are made available to the public without specific charge and (c) are primarily financed through tax levies. Consequently, the primary accounting concerns are with levying and collection of taxes and the control of funds thus raised.

However, when commercial undertakings are operated by the government, the accounting systems followed are similar to those in the private enterprise sector.

The general purposes of government accounting being the recording of receipts and expenditures as well as receivables and committed expenses, the timely presentation of such information as would facilitate formulation and execution of public policy in coherence with the legislative framework is important. The accounting system followed must show whether legal provisions have been complied with and must reveal the financial condition and results of the operation of the government unit concerned. In the case of conflict between legal provisions and sound accounting practices, the former would take precedence. Accounting follows the double entry framework. Funds are set up, e.g., General Fund, Special Revenue Fund, Working Capital Fund, Special Assessment Fund, Bond Fund, Sinking Fund, Trust and Agency Fund or Utility Fund, etc. The self-balancing system may be used for control of individual

funds. Since budgetary control is usually in force, accounting systems are designed so as to facilitate such control.

Aggregation on the basis of micro accounts is considered possible because the relationships obtaining are as follows:

for the i th individual in a closed economy

$$FA_i + PA_i = L_i + NW_i , \quad (1)$$

where FA_i stands for financial assets such as accounts receivable (net); PA_i stands for physical assets such as land and buildings, plant and machinery, furniture and fixtures, inventories, etc.; L_i stands for liabilities of the i th individual to other individuals; and NW_i stands for net worth of the i th individual, considering this individual's case as an accounting entity.

Hence,

$$FA_i - L_i = NW_i - PA_i = B_i , \quad (2)$$

where B_i stands for the net creditor position of the i th individual.

Therefore,

$$\sum_i FA_i - \sum_i L_i = \sum_i NW_i - \sum_i PA_i = \sum_i B_i = 0 . \quad (3)$$

This is necessarily so in a closed economy and follows from the fundamental accounting identity or truism.

In a closed economy, the equality of the total stock of wealth with the net worth of the economy can be easily demonstrated from the above:

$$\sum_i NW - \sum_i PA = 0 ;$$

hence,

$$\sum_i NW = \sum_i PA . \quad (4)$$

The equality between savings and investment is also clearly demonstrable:

$$\begin{aligned} I &= \Delta PA = \Delta NW + \Delta L - \Delta FA \\ &= \Delta NW - (\Delta FA - \Delta L) ; \end{aligned} \quad (5)$$

$$S = \Delta NW = \Delta PA + (\Delta FA - \Delta L) . \quad (6)$$

Hence,

$$\begin{aligned} S &= \Delta PA + \Delta B \\ &= I + (B_t - B_{t-1}) , \end{aligned} \quad (7)$$

where I and S stand for investment and saving, respectively;

B_t = net creditor position at time t,

and B_{t-1} = net creditor position at time t-1.

In a closed economy, ΔB when aggregated over all individuals equals zero, and hence, $I = S$.

In an open economy, effects would be transmitted to the national income and product via $\Delta B \neq 0$. This can be conveniently shown with the following highly simplistic numerical example for an open economy, using the tools of conventional accounting.

Balance Sheet as of December 31, 1977 (\$ billions)

Assets		Liabilities and Net Worth	
Physical assets	40	Net worth	50
Financial assets	<u>13</u>	Liabilities	<u>3</u>
	53		53

Balance Sheet as of December 31, 1978 (\$ billions)

Assets		Liabilities	
Physical assets	45	Net worth	60
Financial assets	<u>19</u>	Liabilities	<u>4</u>
	64		64

Here,

$$\Delta PA = 5 ,$$

$$\Delta NW = 10 ,$$

and

$$\Delta B = 5 = \Delta FA - \Delta L .$$

Hence,

$$I = \Delta PA = \Delta NW - \Delta B ,$$

$$S = \Delta NW = \Delta PA + \Delta B ,$$

and

$$\sum_i \Delta PA = \Delta \sum_j p_j q_j , \quad (8)$$

where p stands for price and q stands for quantities of products--goods or services. Then

$$B_t = B_{t-1} + i_t B_{t-1} + W_t ; \quad (9)$$

i_t is the interest rate and $W_t = (\text{Exports} - \text{Imports}) + (\text{Intransfers} - \text{Outtransfers})$.

Change in physical assets (i.e., ΔPA) can be caused by

$$1) \sum p_j (\Delta q_j) ,$$

where q_j goes up upon production and goes down upon consumption and where it is possible to conceive of q_j as inputs and outputs, and

$$2) \sum q_j (\Delta p_j) ,$$

where capital gains may cause p_j to move upward and capital losses may cause p_j to move downwards.

National income accounts have been capturing these phenomena. Calculations can be simplified by assuming the existence of perfect capital markets, uniform and universal discount rate, the impossibility of defaults or bad debts, the neutrality of money, the nonexistence of transaction costs, and so on.

At the macro level

Hence, at the macro level the balancing of economic accounts represents fundamental economic and accounting identities. The value of production (receipts from sales plus the value of inventory change) equals the cost of producing the output. Income equals disposition of income via expenditure, transfer payments, or savings.

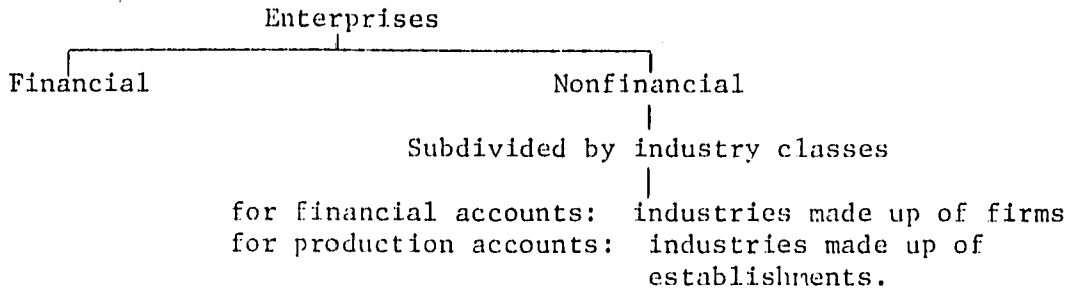
In the capital account, additions to capital are financed by saving, net capital transfer, and net borrowing. In each sector, balance sheet assets equal liabilities plus net worth (the residual). The major dimensions of the macro accounts are as follows:

1. Sectorization or grouping of the various types of transactors in the economy.
2. Setting up of subaccounts for the main forms of economic activity.
3. Providing detailed supporting tables for the chief types of items or classes of transaction.

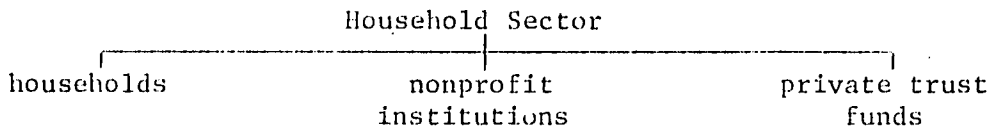
Sectorization Transactors are usually grouped according to similarity or otherwise, in economic motivation and behavior. The United Nations System of National Accounts (SNA) [100] distinguishes three main sectors.

The enterprise sector This sector includes all organizations and business firms that produce outputs (goods and/or services) with the intention of disposing of them and to cover costs. This sector would, therefore, comprise private corporations, unincorporated private businesses, self-employed craftsmen and professionals, nonprofit institutions serving other enterprises, cooperatives other than nonprofit institutions serving households, households and institutions functioning as landlords, and public enterprises.

Enterprises may be further classified as follows for the purpose of flow of funds accounts:



The household sector This sector is comprised of private households and nonprofit institutions rendering service principally to such households. The members of this sector are the chief recipients of income from the production account and their disbursements are geared to satisfaction of their wants. Households would include single individuals, families, and persons in institutions. A useful classification in this sector may run as follows:



The UN SNA provides for a "rural sector" which may be of particular importance in developing countries, since the degree of urbanization is frequently considered to be a key indicator.

The general government sector This sector includes central or federal, state, and local government agencies that render services and derive support from general tax revenue. Depending on the need for detailed financial reports, agencies and funds operating in this sector may be segregated: subsectors may be provided for federal or central, state, and local governments and agencies may be classified by major functions.

Setting up sub-accounts for main forms of economic activity Three
 major forms of economic activity have been distinguished in the SNA, viz., production, appropriation and disposition of income, and formation of capital. It is possible to consider a fourth form of activity if the capital account is concerned with the formation of real capital, namely, the financing of capital formation. The sector accounts may be subdivided according to these forms.

Providing detailed supporting tables for the chief types of items or classes of transaction Goods are distinguished from services and are also distinguished by major categories. Distinction is made between transfer or tax payments, saving or purchases of financial claims, factor income, legal organizational forms, and so on. Extensive detail is usually provided for in the supporting tables.

The chief sources of data are occasional industrial or other censuses, sample surveys of businesses and of households, tax returns, legislative and other reports on government expenditure, foreign trade and payments statistics, social security records, and others.

The production account Income and product may be viewed as the consolidation of the production accounts for the various producing industries, since national income may be defined as the income accruing to the members of a nation from the use of their labor and property in productive pursuits and national product may be defined as the market value of the end-result, final goods and services.

It is admittedly true that there exist both economic and noneconomic activities. But, income and product take into account only those

transactions which pass through organized markets plus "value imputations for major market counterparts," as has been pointed out by Kendrick [52, p. 25]. He further observes that:

Imputations generally made for nonmarket activities include those for payments in kind, the rental value of owner-occupied houses, certain financial services for which only indirect payment is made (such as interest foregone in return for the checking services of commercial banks), and food produced and consumed on farms. In an effort to expand somewhat the area of imputations, the United Nations SNA recommended imputations at sales value for all primary output (from hunting, fishing, forestry, and mineral extraction, as well as from farming), whether sold or used by the producers, and for products of their own trades consumed by the producers.

Because of the greater importance of household production in less developed countries, it is apparent that income and product estimates tied closely to market criteria can give distorted results in temporal or international comparisons.

Production by sectors and industries It is important to realize that though the enterprise sector is the principal contributor to production, households, nonprofit institutions, and government also hire factor services and contribute to the total value of product.

Production accounts for enterprises can be obtained from their profit and loss statements or revenue statements. When production accounts of enterprises within a sector or industry are consolidated, intrasectoral transfers or intra-industry transfers, or intermediate sales and purchases, cancel out; as intermediate items are removed, we can arrive at the "value-added."

Financial intermediaries warrant special treatment: in their case, the value-added, or factor and nonfactor costs, equals the actual and imputed service charges less purchases from other enterprises.

Value-added by the nonenterprise sector Since the output approach cannot be applied to an assessment of the value-added by these sectors, a roundabout route may be adopted. Kendrick [52, p. 27] points out that:

...income originating can be estimated in terms of the factor costs and nonfactor charges against product. Indirect taxes and subsidies are not relevant to the government sector. Some countries also do not impute interest and depreciation charges to capital owned by governments, but calculate the income and product of governments only in terms of employee compensation. The compensation of domestic employees is counted as originating in the household sector, but usually no return is imputed to the durable equipment owned by households. A return is imputed to owner-occupied dwellings, but homeowners are counted for this purpose as being in the enterprise sector.

Input-output tables and economic accounts The input-output tables depict interindustry or intersectoral relationships and are basically a disaggregation of the industry production accounts.

The appropriation accounts These accounts serve to show the receipt and the disposition of income by sectors.

Capital account The capital account, as has been pointed out earlier, rests on the fundamental Keynesian identity of savings and investment; gross domestic investment plus net foreign investment equals gross saving of the domestic sectors when looked at from the

national level. Consolidation of sector capital accounts serves to establish the identity between savings and investment as net borrowing and net capital transfers among domestic sectors cancel out.

Flow of funds accounts have been constructed by setting up separate sector accounts for financial and nonfinancial business and by bringing down to the financing account the net borrowing or lending appearing in capital reconciliation accounts as balancing items. When saving and investment for all sectors in the economy are summed, the intersectoral financial flows cancel out. The flow of funds accounts showing the sources and uses of funds may serve several policy purposes.¹

Balance sheets and wealth statements As noted in our discussion of micro accounting concepts, assets, liabilities and net worth on sector balance sheets and combined balance sheets change as a result of investment and saving, capital transfers, borrowing and lending, and capital gains and losses resulting from revaluation of claims due to changes in market prices. Upon consolidation of sector balance sheets, the intersectoral claims and liabilities cancel out and national net worth equals tangible or physical domestic assets plus net foreign assets. The change in national net worth equals net investment and net saving, plus revaluations.

The macro-accounts have been extremely useful for interpreting and forecasting the economic situation at various levels, for making projections under certain assumptions, for evaluation of performance,

¹See, for example, Kendrick [54, pp. 202, 256-258].

and for evaluation of alternative policies. They serve as the basic data bank for macro-level analysis of market forces. We have used them systematically for four decades, and they will be in use for years to come. However, our object here is to explore whether our understanding of a social system would be advanced by using the total income approach.

CHAPTER IV. ROOM FOR IMPROVEMENT: A QUEST FOR AN
IMPROVED MEANS OF COMMUNICATION AND MEASUREMENT

Conventional economic theory views a consumer, an individual or a household (where the household constitutes the decision-making unit) as allocating money income exhaustively among goods and services so as to maximize utility subject to an income or budget constraint. The consumer is assumed to be capable of ranking commodity combinations consistently in order of preference. Utility functions are considered ordinal:

$$\text{Maximize } U = U (X_i) \quad i = 1 \dots n$$

Subject to

$$I = \sum P_i X_i ,$$

where X_i stands for goods and services or commodities and P_i stands for prices of these goods and services and I stands for money income.

Constrained optimization implies first order conditions:

$$\frac{\partial U}{\partial X_i} / \frac{\partial U}{\partial X_j} = \frac{P_i}{P_j}, \quad i \neq j$$

Second order conditions imply indifference curves convex from below for a maximization of utility.

A consumer's demand curve for a commodity can be derived from the first order conditions. Demand curves are single valued and homogeneous of degree zero in prices and income.

An individual's work-leisure decisions are also analyzed in this rational decision format. Work performed leads to disutility, leisure

contributes to utility while income earned, being a proxy for consumption, leads to utility:

$$U = Q(R, I)$$

where $R = \text{Leisure} = 24 \text{ hours per day} - L$; $L = \text{hours per day of Labor}$;
 $C = \text{Consumption}$; and $I = \text{Income}$.

This may be expressed as:

$$\text{Utility function: } U = G(C) + H(L)$$

$$\text{Production function: } C = \phi(L)$$

with

$$\frac{dG}{dC} > 0, \quad \frac{d^2G}{dC^2} < 0, \quad \frac{dH}{dL} < 0, \quad \frac{d^2H}{dL^2} < 0, \quad \frac{\partial^2 U}{\partial C \partial L} = 0;$$

the trade-off boils down to:

$$-\frac{dH}{dL} = \frac{dG}{dC} \cdot \frac{dC}{dL}$$

In other words the individual would work till the point where his marginal disutility from working equalled his marginal utility from consumption.

An interesting facet of this analysis is that rewards from work-related skills of the individual which can be traded in a market system have presumably been considered. Nonwork-related skills also give rise to rewards, which may not always be translated into money terms in real life situations. Secondly, money income, in reality, is not the only income. An individual may derive rewards in the form of job satisfaction, status, social recognition, scope of satisfaction of second order needs [66] and so on.

The conventional treatment does indeed make room for analysis of a consumer's reaction to price and income changes in terms of substitution and income effects and is generalized. The utility theoretic approach and the approach via revealed preference theory lead us to the same basic conclusions regarding consumer behavior. But we do not explicitly or implicitly recognize the role of nonwork related skills and the use thereof, and the role of nonmoney income and the deployment thereof. In reality, a highly skilled technician's or for that matter anyone's job choice may be affected not only by work-related skills, but also by factors like value commitments, inter-personal relationships, etc.

As far as producer-behavior is concerned we assume convex (to the origin) isoquants and view the producer as engaged in constrained optimization once again, given his production function relationship and his cost equation. The producer is seeking to maximize output subject to the cost constraint or seeking to minimize cost given the output level, as follows:

Given the production function: $Q = f(q_i) \quad i = 1 \dots n,$

where $Q =$ output and $q_i =$ input, $i = 1 \dots n;$

(a) Maximize $Q = f(q_i), i = 1 \dots n,$

Subject to $C = \sum r_i q_i + b,$

where C stands for total cost, r_i for input prices and b for fixed cost,

or

(b) Minimize $C = \sum r_i q_i + b$

given $Q = Q^0$, where $Q^0 =$ specified output level.

This constrained optimization implies the first order conditions

$$\frac{\partial Q}{\partial q_i} / \frac{\partial Q}{\partial q_j} = r_i / r_j , \quad i \neq j .$$

The second-order conditions require that marginal physical productivity be positive and be decreasing for all i 's.

The output decision obtained via the output maximization or cost minimization process is linked to the profit maximizing solution. Indeed, conventional theory underlines the role of profit maximization in producer-behavior: when data are available on the production function, the cost equation and the expansion path function, it is possible to express total cost as a function of output levels. The first order conditions for profit maximization require that the producer turn out that quantum of output for which the marginal cost equals the price and the second order conditions require that the marginal cost curve be rising.

Where the production function under consideration is homogeneous of degree one, Euler's theorem can be used to demonstrate that total output is just exhausted if each input is paid for its marginal physical productivity. It has, however, been recognized that assumptions of competitive profit maximization break down if the producer's long-run production function is homogeneous of degree one. The condition of product exhaustion can be likened to the condition that maximum long-run profit equals zero.

According to conventional theory the first order conditions for profit maximization require that, where more than one output is produced, the rates of product transformation between every pair of outputs equal their price ratios; where more than one input is used, the value of the marginal productivity of each input with respect to each output equals the input price, and the rates of technical substitution between every pair of inputs equal their price ratios.

The aggregate demand function is derived from the demand functions of individual consumers and the aggregate supply function is derived from individual supply functions. Market equilibrium is attained when demand equals supply and implies consistency of buyers' desires and sellers' desires. Equilibrium in a factor market would imply that the price of the factor equals the value of its marginal product.

Competitive market conditions are assumed for analytical purposes and the accepted theory has been extended to the analysis of problems of externalities in production and/or consumption, public goods, imperfect competition and market failure in general.

The competitive model allows us to demonstrate readily the existence of multi-market equilibrium. Long-run equilibrium requires that every market be cleared and that profit of the representative firm in each industry equal zero.

Conventional theory has focused heavily on welfare economics, which, nevertheless is still plagued with several thorny issues. Since elaborate value judgments regarding the desirability or otherwise of

alternative income distributions are frequently not available, economists have focused their attention on the Pareto criterion.

A reallocation is considered to be an improvement in welfare if it makes at least one person better off without making anybody worse off. Pareto optimality requires that the corresponding rates of commodity substitution of all consumers are equal, the corresponding rates of transformation of all producers are equal and the rates of substitution equal the corresponding rates of transformation and that the second order conditions are duly fulfilled.

A competitive model makes room for the fulfillment of the first-order conditions for Pareto optimality.

However, this model, as has been pointed out earlier, considers merely the work-related skills to the exclusion of all other skills and money income to the exclusion of nonmoney rewards, though we can readily identify situations where nonwork-related skills and nonmonetary rewards are important.

The Department of Labor has published copious volumes showing that a particular job requires certain general, verbal and numerical ability, has a given position in the data-people-things hierarchy, implies certain physical demands and working conditions and the incumbent thereof has definitive worker traits, aptitude and temperament. Neither the producer nor the consumer is limited to choice in terms of work-related skills and money income.

We may view an individual as having a vector of resources that can be classified into five broad groups: (a) physical, mental, and

emotional health; (b) work-related and nonwork-related skills; (c) value commitments and character; (d) socially-validated resources, such as prestige, political power, and power in formal organizations; and (e) rights to income from property and transfer payments. While (a), (b), and (c) are embodied in the individual, (d) depends on evaluation of the individual by others--peers and colleagues, friends and foes and so on--and their responses to initiatives by the individual concerned; (e) is also dependent on social validation and is geared to the nature of the prevalent institutions. This should now give us a more comprehensive picture of the resource vector assuming we have no quibbles over basic issues such as the institution of private property or the redistribution of income via transfer payments.

The individual applies his work-related skills to some occupation and receives the going wage or salary. When we assume perfectly competitive conditions and constant returns to scale in a general equilibrium set-up, this would mean that this wage or salary equals his marginal physical productivity and this would be in consonance with accepted economic theory. The individual also receives streams of rewards for his other skills, his reputation, and other resources which are not traded in the conventional market.

The subsequent question would be the valuation of these other resources. The individual's trade-offs between money income arising from work-related skills and other resources at the margin can, in principle, be established with the aid of the theory of revealed

preference. If the attributes of behavior settings--spatial-temporal units covering all activities (for example, dinner with the family, 4-H Club meeting, church Sunday service, school classes, etc.)--are changed, we can study how the individual's time allocation changes. These trade-offs should permit the assignment of equivalent dollar values to streams of nonmoney rewards the individual receives for his resources other than the work-related skills and rights to income from property and transfer payments.

It would be possible now to consider as the individual's total income the sum of the equivalent dollar values of nonmoney rewards and money income.

We may view this individual as allocating his total income, in place of money income (as is done in conventional economic theory) exhaustively among behavior settings so as to maximize his utility from the use of all his resources. The particular combination of behavior settings chosen by the individual defines his life style during the accounting period under consideration.

Double entry is satisfied as:

$$\begin{aligned} \text{Total income} &= \text{time allocated to various behavior settings (work} \\ &\quad \text{settings and all other settings)} \\ &\quad \text{times hourly rate} \\ &= \text{total rewards from behavior settings.} \end{aligned}$$

Pursuit of this kind of approach will allow us to trace how life styles have been changing as the society moves on. Following Shils [82] we may argue that, in a well-integrated national society, the most rewarding

life styles are those involving close contact and identification with and/or greatest similarity to those of persons at the "center" of the society. In other words, we recognize that it is possible for the masses to enjoy fuller and more rewarding lives by sharing the central value system of the society and by having increased mutual awareness and decreased social distance. When social accounts allow us to capture the impact of life styles, our efforts at assessment of social performance, including economic performance, are likely to be rewarded.

The supply of behavior settings depends not only on optimizing behavior in the economic realm but also on the society's response to the revealed preferred choices by the individuals comprising the society. A bowling lanes operator operates in pursuit of his goal of profit maximization and because some people in the community consider bowling to be an enjoyable recreation. The choices of behavior settings by individuals may change because of changes in either their money incomes or in their nonmoney incomes, if total incomes remain the same. For instance, suppose that in a hypothetical community 100 people patronize this bowling operation. If several patrons are exposed to illness, emotional shocks, hazards or stress or their value commitments change, they could likely discontinue their patronage of the bowling operation, thereby rendering it impossible for the operator to carry on his business profitably.

Holmes and Rahe [47] have developed a social readjustment rating scale showing the magnitude of social readjustment following life events such as death of spouse, divorce, marital separation, death of

close family member, personal injury or illness, marriage, change of work hours or conditions, change of responsibilities at work, revision of personal habits, and change in living conditions. A table showing the scale is reproduced here from Fox [29, p. 102]:

Social Readjustment Rating Scale^a

Rank	Life Event	Mean Value
1	Death of spouse	100
2	Divorce	73
3	Marital separation	65
4	Jail term	63
5	Death of close family member	63
6	Personal injury or illness	53
7	Marriage	50
8	Fired at work	47
9	Marital reconciliation	45
10	Retirement	45
11	Change in health of family member	44
12	Pregnancy	40
13	Sex difficulties	39
14	Gain of new family member	39
15	Business readjustment	39
16	Change in financial state	38
17	Death of close friend	37
18	Change to different line of work	36
19	Change in number of arguments with spouse	35
20	Mortgage over \$10,000	31
21	Foreclosure of mortgage or loan	30
22	Change in responsibilities at work	29
23	Son or daughter leaving home	29
24	Trouble with in-laws	29
25	Outstanding personal achievement	28
26	Wife begin or stop work	26
27	Begin or end school	26
28	Change in living conditions	25
29	Revision of personal habits	24
30	Trouble with boss	23
31	Change in work hours or conditions	20
32	Change in residence	20
33	Change in schools	20
34	Change in recreation	19
35	Change in church activities	19
36	Change in social activities	18

Rank	Life Event	Mean Value
37	Mortgage or loan less than \$10,000	17
38	Change in sleeping habits	16
39	Change in number of family get-togethers	15
40	Change in eating habits	15
41	Vacation	13
42	Christmas	12
43	Minor violations of the law	11

^aSource: Thomas H. Holmes and Richard H. Rahe, "The Social Readjustment Rating Scale," Journal of Psychosomatic Research 11 (1967), Table 3, p. 216.

Major life events could alter life styles and this would invariably be reflected in the choice of behavior settings. When a person is physically, emotionally or mentally unwell his resources in this area dwindle and even if all his other resources remain invariant his total income drops, causing him to reallocate his reduced total income among behavior settings so as to maximize his utility from the resources still at his disposal.

The approach we are going to outline in the next chapter is an effort at improving data systems and at comprehending social systems via a set of social accounts. The accuracy of the prices assigned to nonmarket resources and the valuations of nonmarket rewards will not be as precise as those that are determined under the conventional market system, but we will nevertheless obtain a closer approximation to the complete life situations of members of society than is provided by the conventional economic accounts.

In the next chapter I have excerpted a description of the Fox-Van Moeseke model for the individual and the method suggested by

Fox for preparation of social accounts at the level of a small community.

The chapter also contains brief descriptions of the data sources, methods used and assumptions made; a pilot set of accounts in the form of condensed and abbreviated tables is furnished in Chapter VI.

CHAPTER V. THE FOX-VAN MOESEKE
TOTAL INCOME APPROACH

The first section of this chapter is reproduced from Fox [29, pp. 20-28] and is based entirely on Fox's work. The second section is an excerpt from a joint paper by Fox and Van Moeseke [36], which was reprinted as Chapter 3 of Fox [29]. Van Moeseke expressed Fox's somewhat intuitive model in the language of mathematical programming and proved that Fox's conclusion could be derived rigorously from his assumptions; the rigorous version is known as the Fox-Van Moeseke model and we will refer to the general approach as the Fox-Van Moeseke total income approach.

Section 1. A Tentative Integration of Concepts to Measure an Individual's Total Income¹

Our approach in this section is largely intuitive. However, a number of the concepts presented in previous sections lend themselves to a tentative synthesis.

Parsons's Media of Social Interchange. Parsons's media include influence, money, political power, and value commitments; erotic pleasure; affect (including recognition and response); technological know-how and skill; ideology, conscience, reputation, and faith. Some of these media circulate mainly in specific "authority systems" (in Barker's sense): money in the economy; political power in the polity, faith in churches, reputation in scientific and professional communities, technological know-how and skill in appropriate occupational groups and labor markets, influence in territorially based communities, and so on.

¹Reproduced from Fox (29, pp. 20-28).

A number of Parsons's media seem to have "human capital" aspects. This is clearly true of technological know-how and skill. Higher wages paid to experienced workers imply that human capital is produced on the job as well as in schools. Influence, political power, and reputation usually require considerable application over a period of years--a demonstrated capacity to deliver a specified volume of a desired output per unit of time. Value commitments may also have to be demonstrated over a period of years to become media of exchange capable of influencing the behavior of others. A long record of (almost always) "correct" choices from the standpoint of ideology, conscience, or faith establishes an empirical relative frequency basis for predicting such probabilities.

Levinson's Ego Ideal. Levinson states that a person's ego ideal is his vision of himself at his future best.

As a step toward measurement, the ego ideal might be represented as a vector of desired stocks of Parsons's media of exchange at each point in a person's life cycle. At each point a shortfall in actual stocks relative to desired stocks would call forth efforts to raise the actual closer to the ideal. This leads to a stock-adjustment equation:

$$e = d(s^* - s); \quad e, d, s^*, s: n \times 1 \quad (1)$$

where e ("effort") is a time-and-effort allocation vector, s^* and s are vectors of desired stocks and actual stocks, respectively, and d is a vector of adjustment coefficients per time period. We could rewrite (1) with a time lag as

$$e_t = d(s^*_{t+1} - s_t) \quad (2)$$

to reflect the dynamic flight-and-pursuit nature of the endeavor, with achievement typically lagging behind aspiration.

A person whose ego ideal is realistic should be able to estimate approximately how much effort will be required to achieve a certain stock (or annual flow) of each medium; he should allocate his effort so that the expected marginal value product of a unit of effort directed at each goal will be the same, measured in terms of his own utility function.

Cantril's ladder-of-life device or Self-Anchoring Striving Scale (1965, p. 22) might be used to help a person express perceived discrepancies between his ego ideal and his actual condition. The discrepancy for each medium would be stated in numbers of ladder steps on a scale ranging from 0 for the worst to 10 for the best possible situation he could visualize for himself with respect to that medium. If one step on the money dimension were taken as unity, the person could express the relative importance of one step with respect to any other medium as a fraction or multiple of one. Furthermore, one step on the money dimension might be stated in terms of dollars (of assets or annual income); if so, the other media also could be given dollar values per step.

Barker's Behavior Settings and Related Concepts.

Several of Barker's concepts link up well with those of Parsons.

1. Barker's five behavior mechanisms (affective behavior, gross motor activity, manipulation, talking, and thinking) occupy most if not all the time in public behavior settings; these mechanisms have a long evolutionary history. The established equilibrium for an individual at a particular stage of his life cycle would probably involve certain amounts (duration multiplied by intensity) of use of each of these five behavior mechanisms.

2. Barker's authority systems include businesses, churches, governments, schools, and voluntary associations--these control "public" behavior settings. Families could no doubt be added as the authority systems that control behavior settings in private homes.

3. Some of Barker's action patterns seem to have very nearly a one-to-one correspondence with specified authority systems, namely, the action patterns called business, religion, government, and education. Professionalism as an action pattern seems to interpenetrate the other four. The remaining six action patterns (nutrition, personal appearance, physical health, aesthetics, recreation, and social contact) seem to be largely independent of authority systems other than families and, in some cases, perhaps, voluntary associations.

4. Barker's degrees of local autonomy (town, school district, county, state, nation) might be generalized into successive levels in an administrative decision-making hierarchy, regardless of

whether the successive levels were located in a single building or in a hierarchy of central places that controlled system operations over successively larger geographic territories.

We will make use of Barker's basic concept of behavior settings shortly in a more formal model.

An Approach to Measurement of a Person's Total Income. If we extend Barker's system of behavior settings to include all places of employment and all residences (plus settings occupied by residents of the community when they leave it temporarily on business or personal trips), we can establish an accounting system that is exhaustive with respect to living time, including sleep and private activities.

Each individual in a behavior setting has a role (student or teacher, grocer or customer, chairman or member, etc.). If two or more persons are involved in a behavior setting, there occur "transactions" [in the terminology of Berne (1964)], involving recognition and response. The utility of a behavior setting to an individual is a function of the setting as such, his own role in the setting, and his perception of his effectiveness in the role as evidenced by the behavior of other participants toward him.

We might postulate, then, that a "rational" personality will allocate his time among behavior-setting-and-role combinations so as to maximize their (expected) total utility. If a role has a quality dimension, more preparation time may be required to perform it well than to perform it at the threshold of adequacy.

If we assume that a consumer can rate any two arrays of commodities as "A preferred to B," "B preferred to A," or "indifferent as between A and B," it may be equally reasonable to assume that a person can make similar orderings of two arrays of behavior setting, role, and quality-of-performance-in-role combinations.

In the case of economic transactions, we multiply observed market prices by quantities of the respective goods and services produced in a nation and compute gross national (economic) product, GNP. The ratios of market prices (under certain restrictive assumptions) are equal to the ratios of the marginal utilities of the corresponding commodities

to each consumer. If the market prices for some base year are used as fixed weights, we can compute changes in "real" GNP over a period of years.

Would it mean anything to perform the same operation for all Parsons's media of exchange? Perhaps so, if we visualize a person as trying to maximize his total utility from a year of living by using his total capacities in the most effective way. If there are s media of exchange, n potential activities representing essentially all forms of human behavior, and s restrictions limiting the amounts of each medium that a given individual can use ("spend") as inputs into the social system, our model becomes:

$$\max U = f(t_1, t_2, \dots, t_n) \quad \text{subject to} \quad (3)$$

$$\sum_{i=1}^n t_i p_i = Y = b_1,$$

$$\sum_{i=1}^n t_i m_{2i} = M_2 = b_2,$$

$$\sum_{i=1}^n t_i m_{3i} = M_3 = b_3,$$

.

.

.

$$\sum_{i=1}^n t_i m_{si} = M_s = b_s,$$

$$\sum_{i=1}^n t_i = 8760. \quad (4)$$

Then

$$\frac{\partial U}{\partial t_i} - \lambda_1 p_i - \lambda_2 m_{2i} - \lambda_3 m_{3i} - \dots - \lambda_s m_{si} - \lambda_t = 0, \quad (5)$$

for all $i = 1, 2, 3, \dots, n$,
and

$$\frac{\partial U / \partial t_i}{\partial U / \partial t_j} = \frac{\lambda_1 p_i + \lambda_2 m_{2i} + \lambda_3 m_{3i} + \dots + \lambda_s m_{si} + \lambda_t}{\lambda_1 p_j + \lambda_2 m_{2j} + \lambda_3 m_{3j} + \dots + \lambda_s m_{sj} + \lambda_t}. \quad (6)$$

Each unit of activity i uses up some time; many activities use up some money; some use personal influence; some use professional reputation; and so on. Each activity involves occupying a behavior setting and performing some role in it at a specified quality level. Each medium of exchange corresponds to a goal of activity for some if not all personalities. Some of Parsons's media seem to be stocks (e.g., professional reputation) that yield a flow of inputs into the social system and bring in a flow of outputs or rewards from the social system. Intense application may increase professional reputation; diversion of effort to politics or gardening may cause it (or permit it) to decline. In measuring the utility enjoyed by a personality during a given year only the flows of rewards associated with possession of stocklike media should be included.

Since some activities bring in only one or two of the s kinds of reward from the social system and use only one or a few kinds of the s resources or "contributions," there would be many zeros in the $n \times s + 1$ "technology" matrix, hence in the expressions for the $\partial U / \partial t_i$, $i = 1, 2, \dots, n$. If the individual is free to convert time into money income and into flows of each of the other $s - 1$ resources, the initial b_i 's can be adjusted until the marginal utilities of time converted into all other limiting resources are equal.

Consider the following matrix of exchange rates among marginal utilities of the s resources (and time):

$$\begin{array}{c}
 \lambda_1 \quad \lambda_2 \quad \lambda_3 \quad \lambda_4 \quad \dots \quad \lambda_s \quad \lambda_t \\
 \lambda_1 \left[\begin{array}{ccccccc}
 1 & k_{12} & k_{13} & k_{14} & \dots & k_{1s} & k_{1t} \\
 k_{21} & 1 & k_{23} & k_{24} & \dots & k_{2s} & k_{2t} \\
 k_{31} & k_{32} & 1 & k_{34} & \dots & k_{3s} & k_{3t} \\
 k_{41} & k_{42} & k_{43} & 1 & \dots & k_{4s} & k_{4t} \\
 \cdot & \cdot & \cdot & \cdot & & \cdot & \cdot \\
 \cdot & \cdot & \cdot & \cdot & & \cdot & \cdot \\
 \cdot & \cdot & \cdot & \cdot & & \cdot & \cdot \\
 \lambda_s & k_{s1} & k_{s2} & k_{s3} & k_{s4} & 1 & k_{st} \\
 \lambda_t & k_{t1} & k_{t2} & k_{t3} & k_{t4} & k_{ts} & 1
 \end{array} \right]
 \end{array} \quad (7)$$

The last row k_{tj} indicates the marginal rates at which time can be converted into each of the s media; the corresponding element in the last column, k_{jt} , is the reciprocal of k_{tj} (e.g., $k_{1t} = 1/k_{t1}$). If so, we have

$$\begin{aligned}\lambda_t &= k_{t1}\lambda_1, \\ \lambda_2 &= k_{2t}\lambda_t = k_{2t}k_{t1}\lambda_1, \\ \lambda_3 &= k_{3t}\lambda_t = k_{3t}k_{t1}\lambda_1, \\ &\vdots \\ \lambda_s &= k_{st}\lambda_t = k_{st}k_{t1}\lambda_1.\end{aligned}\tag{8}$$

In this kind of equilibrium for the individual, we can write

$$\frac{\partial U}{\partial t_i} = \lambda_1 [p_i + k_{t1}(1 + k_{2t}m_{2i} + k_{3t}m_{3i} + \dots + k_{st}m_{si})].\tag{9}$$

If we multiply $\partial U/\partial t_i$ by t_i/λ_1 and sum over $i = 1, 2, \dots, n$, the first term, $\sum_{i=1}^n t_i p_i = Y$, is a component of GNP (i.e., the total consumption expenditures of the individual). The remaining terms are also expressed in dollars. The sum of all such terms would be the total income received by the individual.

If an individual is making an optimal allocation of his time, the marginal utility of an additional hour per year should be the same in each behavior setting in which he participates. If cardinal measures were devised for the s media of exchange and the quantities of each contributed and received per hour in each of $n > s$ behavior settings were measured, it appears that relative marginal utilities such as λ_2/λ_1 , λ_3/λ_1 , ..., λ_s/λ_1 might be estimated by statistical means. Each behavior setting would yield an observation equation as follows:

$$\frac{\partial U}{\partial t_i} = \lambda_1 p_i + \lambda_2 m_{2i} + \lambda_3 m_{3i} + \dots + \lambda_s m_{si} + \lambda_t.\tag{10}$$

However, $\partial U / \partial t_i$ should be the same for all $i = 1, 2, \dots, n$, and t should be a constant; each observation equation could be rewritten as

$$p_i = \frac{1}{\lambda_1} \left(\frac{\partial U}{\partial t_i} - \lambda_t \right) - \frac{\lambda_2}{\lambda_1} m_{2i} - \frac{\lambda_3}{\lambda_1} m_{3i} - \dots - \frac{\lambda_s}{\lambda_1} m_{si}. \quad (11)$$

Now, p_i is the money cost per hour of occupying behavior setting i . The variance of p_i among the n behavior settings should be attributable to variations in m_2, m_3, \dots, m_s among the n settings. A least squares estimate of $(-\lambda_2/\lambda_1)$ would indicate that a unit difference in m_2 per hour between two behavior settings would offset a difference of $(-\lambda_2/\lambda_1)$ dollars per hour in the costs of occupying them. If an hour in each of two alternative settings is regarded as an offer with price and nonprice aspects, $(-\lambda_j/\lambda_1)$ translates the j th nonprice difference into a money equivalent; that is, a tradeoff between a price and a nonprice offer variation.

The Place of the Organism in Social System Models.

Parsons states that the outputs of the social system are delivered to personalities--not, except in certain borderline cases, to organisms.

The model in the preceding section, which is formulated in terms of optimizing the flow of rewards to a personality, could perhaps be supplemented by a set of constraints relating to the welfare of the organism. Thus we might specify upper and lower bounds for the amount of use of each behavior mechanism (affective behavior, gross motor activity, manipulation, talking, and thinking) to reflect the needs and limitations of the organism. The social rationale for these indulgences is that illness or fatigue of the organism will reduce the ability of the personality to make contributions and to earn (and enjoy) rewards. The prevalence of life, accident, and health insurance symbolizes this dependence of the personality on the survival and good physical condition of the organism. As Cantril points out (1965), "unless the survival needs are satisfied, a person devotes himself almost exclusively to fulfilling them" (p. 315).

There is a tradition of cost-benefit analysis, damage suits and settlements, and percentage disability estimates on which social accounting measurements might build. In general, it appears

that injuries to the organism should be evaluated in terms of foregone reward streams, monetary and nonmonetary, as a consequence of the injuries. Where population groups are suffering extensively from malnutrition and illness, the difference between actual total income and potential total income with adequate nutrition and with illness rates characteristic of higher income groups would be an estimate of the potential social value of the necessary health and nutrition programs.

Optimizing Within a Behavior Setting. The concept of optimization in social transactions is at least implicit in Berne. For example, in describing a simple pastime (1964), he stated that "the transactions are adaptively programmed so that each party will obtain the maximum gains or advantages during the interval. The better his adaptation, the more he will get out of it" (p. 41). Also, the transactions involved are "complementary"--a word Berne used quite frequently.

Barker's discussion of the various forces acting in and upon a behavior setting to maintain its function at a quasi-stationary level is also illuminating. In his classroom example, it appears that any change in functional level that would make some members better off would make others worse off. However, an innovation (such as dividing the class into a number of groups on the basis of proficiency or interest) might lead to a Pareto-better situation in which no student was worse off and most students were better off than before.

A behavior setting may be regarded as a "cooperative plant" that has no objective function of its own but should be managed so as to maximize the total net benefits distributed to the members, each member profiting in proportion to the amount he puts into the setting. Each member tries to allocate his total resources between this setting and all others in a way that will maximize his expected total utility. If the setting is a classroom, the teacher is responsible for managing the setting for the maximum benefit of the students. The students share in proportion to what they put into the setting (including study outside of the class); the teacher may receive various rewards for good management of the setting in terms of (1) implicit or explicit feedback from students as to how much

they are getting out of the course, (2) self-approval for living up to her ego ideal, and (3) higher salary.

Optimization for Sets of Interrelated Behavior Settings. The cost to a person of participating in one behavior setting is the opportunity cost of not participating in the highest-valued alternative setting.

Suppose that in a given community all children aged 6 to 11 are required to be in school for 30 hours a week. If each child has considerable latitude to choose his activities within the school, he may approximate a local optimum and realize most of the complementarities potentially available (from his standpoint) in the school as a whole. Mutually recognized complementarities might lead to near-optimal study groups without external pressure. Each constraint that was thought to be necessary by teachers or administrators could be evaluated in terms of perceived reduction in the outputs of the settings directly and indirectly affected by it.

As in the theory of general economic equilibrium under perfect competition, it would be possible to accept the results of a self-optimizing process without attempting to measure them. However, if pressures and restrictions have been imposed on the self-optimizing process (and the continuance of some restrictions is deemed necessary), measurement of the outputs associated with alternative sets of restrictions is needed for policy guidance.

Optimization for a Small Community. The optimizing model involved in the theory of consumer behavior may be expressed as follows:

$$\max U = f(q_1, q_2, \dots, q_n), \quad \text{subject to} \quad (12)$$

$$\sum_{i=1}^n p_i q_i = Y, \quad (13)$$

where the q_i are quantities of n consumer goods and services, the p_i are the corresponding market prices, and Y is the consumer's income, assumed to be fixed; the consumer's utility function U depends directly only on the quantities consumed, q_i ($i = 1, 2, \dots, n$).

This model implies that the weighted average price elasticity of demand for the q_i is -1 and

the weighted average income elasticity is 1; if all prices and money income are multiplied by the same scalar, the q_i will be unchanged.

If there are no externalities of consumption, these elasticity properties apply also to an aggregate of consumers, such as the 830 residents of Barker's community, provided each of the 830 incomes is fixed and consumers pay the same price for any given commodity.

Do these elasticity properties apply to our model of a person allocating fixed amounts of s media among n behavior settings? We assume that his input into any behavior setting i is a vector of fixed numbers per hour of occupancy and that the output (reward) he gains from that setting is also a vector of fixed numbers per hour of occupancy.

If the money income constraint is binding for the person, the price and income elasticity properties must hold with respect to his economic transactions. By analogy, it seems that the same properties should hold with respect to each of the other media taken separately. If so, the elasticity properties should also hold for each medium separately over an aggregate of consumers whose resource vectors contain fixed amounts of the s media. (These amounts can vary both absolutely and relatively as between different persons.)

Competition among behavior settings for the time of community residents could be conceptualized, recognizing that the total living time of the residents per year is a fixed number; an increase in occupancy time for one genotype setting therefore requires a decrease in occupancy time for one or more other genotype settings.

Suppose a resident is allocating his yearly living time among the n genotype settings available in the community and receiving a vector of rewards per hour in setting i with an equivalent dollar value (to him) of r_i . Then we can write $t = a + Br$ in matrix notation or, in expanded form:

$$\begin{bmatrix} t_1 \\ t_2 \\ \cdot \\ \cdot \\ t_n \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ \cdot \\ \cdot \\ a_n \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ b_{n1} & b_{n2} & \dots & b_{nn} \end{bmatrix} \begin{bmatrix} r_1 \\ r_2 \\ \cdot \\ \cdot \\ r_n \end{bmatrix}, \quad (14)$$

and $\sum_{i=1}^n t_i = 8760$; the total social income of the resident is $\sum_{i=1}^n t_i r_i$. Then the following measure might be taken as a surrogate for his quality of life:

$$\frac{\sum_{i=1}^n t_i r_i}{\sum_{i=1}^n t_i} = \frac{\sum_{i=1}^n t_i r_i}{8760} = \bar{r}. \quad (15)$$

Now, suppose that the matrix B is stated in elasticity form, relating percentage changes in the t_i to percentage changes in the r_i . If every r_i is multiplied by the same scalar, the t_i should not change. Also, if the reward per hour, r_i , for occupying setting i is increased while all r_j 's ($j = 1, 2, \dots, n$) remain constant, occupancy time in setting i should increase or, at the least, not decrease. Hence the diagonal elements b_{ii} will be nonnegative and the off-diagonal elements b_{ij} ($j \neq i$) will, on the average, be nonpositive:

$$b_{ii} \geq 0; \quad b_{ii} + \sum_{\substack{j=1 \\ (j \neq i)}}^n b_{ij} = 0; \quad (16)$$

therefore, we have

$$\sum_{\substack{j=1 \\ (j \neq i)}}^n b_{ij} \leq 0.$$

The genotype behavior settings might be grouped according to "authority systems," using Barker's

terminology: business, schools, churches, government, and voluntary associations (also families, since we are including private as well as public behavior settings in our conceptualization). Thus a resident's living time could be allocated exhaustively (for social accounting purposes) among these six authority systems and an average reward per hour calculated for each one; the weighted average of these six quality measures would be the \bar{r} of (15), a surrogate for the overall quality of the person's life during the specified period.

The quality of life of a resident is improving over time if the value of \bar{r} is rising. If we aggregate over all N residents and all n genotype settings and divide by total living time of the residents, we obtain

$$\frac{\sum_{k=1}^N \sum_{i=1}^n t_{ki} r_{ki}}{\sum_{k=1}^N \sum_{i=1}^n t_{ki}} = \bar{r}_N, \quad (18)$$

\bar{r}_N being the average total income per hour of living time for all area residents. If \bar{r}_N increases over time, the quality of life in the community is improving.

In addition to the crucial problems of measuring exchange rates between media for a given person and aggregating "rewards" over persons, there would remain some more conventional problems, such as (a) comparing rates of change in \bar{r}_N over time as between different communities and (b) comparing absolute levels of \bar{r}_N at a given date across communities.

An increase in the value of output of any behavior setting per participant hour will tend (ceteris paribus) to increase its share of the community's total living time. Some behavior settings are selective with respect to age or other population subgroups; an improvement in recreational programs for the aged would have its primary impact on behavior settings normally occupied by them.

Concluding Remarks

The model described is by no means definitive. However, it suggests some of the problems that must be solved in developing social system accounts that are equally consistent with leading theories in sociology, psychology, and economics.

In the next section, we restate the concept of a person's total income in the language of utility theory and mathematical programming. Hopefully, it will serve as an additional bridge among the three disciplines involved.

Section 2. Outline of the Mathematical Derivation and Implications¹

From a sociological viewpoint, the individual is active in a number of behavior settings belonging to the economy, the polity, the church, the family, the club, and so on. Within each behavior setting, his activity is guided--and restricted--by inputs and outputs (or contributions and rewards) in terms of a number of media of exchange such as money, influence, votes, and professional standing.

We assume that the individual optimizes the allocation of his time among alternative behavior settings under a number of constraints pertaining to several media--money included. The resulting programming model theoretically allows the derivation of a scalar measure, called social income (SI) and expressed in dollars, of the individual's rewards in terms of all social media of exchange, and resulting from his activities in all relevant behavior settings. Summation over individuals would then yield a figure, expressed in dollars, for the social income of any specified population aggregate (nation, region, state, age, sex, occupation, or other grouping).

Empirically meaningful implications of the programming model are derived, in particular: the individual's utility need only be defined up to a monotonic transformation; SI changes proportionately with the general price level in the economy; the individual's choice is

¹From Fox [29, Ch. III; pp. 32-34, 41-42]. The original version appeared in Fox and Van Moeseke [36].

invariant under proportional changes (in particular, changes in the unit of measurement) of inputs and outputs of any medium of exchange; his choice further satisfies the elasticity rule and the Le Chatelier principle. A quadratic approximation to the individual's utility function is derived.

The Model

The individual divides one period of time (the current accounting period) over n behavior settings, hereafter interchangeably referred to as settings or activities, spending the fraction x_j of the unit period on the j th activity. The n tuple x_j , $j = 1, 2, \dots, n$, is denoted by x (where $x \in \mathbb{R}^n_+$). Formally, an individual is a triple $(u: \mathbb{R}^n_+ \rightarrow \mathbb{R}; A; b)$, where u is his utility function; A and b are real matrices, respectively, $m \times n$ and $m \times 1$; b denotes the endowment (or resources) in terms of the different media of exchange; and the elements a_{ij} of A are input coefficients: a unit of the j th activity absorbs a_{ij} units of b_i . The matrices x , A , b express the individual's life style, environment, and endowment, respectively.¹

He faces the programming model (P),

$$\text{maximize } u(x), \quad \text{subject to} \quad (1)$$

$$Ax \leq b, \quad (2)$$

$$x \geq 0. \quad (3)$$

The set $X \equiv \{x \geq 0 \mid Ax \leq b\}$ is called the feasible set of possible activity levels (time allocations to alternative settings).

By way of illustration, we write out the first three rows of (2):

$$-p_1x_1 + p_2x_2 + \dots + p_nx_n \leq y, \quad (4)$$

$$x_1 + x_2 + \dots + x_n \leq 1, \quad (5)$$

$$-w_1x_1 - w_2x_2 - \dots - w_nx_n \leq -w, \quad (6)$$

¹Note that x records the proportions of the individual's time spent in each of the n behavior settings (a complete time budget), hence summarizes his life style. Each column of the matrix A lists the amounts of each of m (economic and social) exchange media absorbed per unit of time spent in a particular setting as an environment for the individual's behavior. The characterization of b as the individual's endowment is straightforward.

and we assume that x_1 denotes time spent at work, x_2 , time spent shopping at the grocery store, and so on. Income constraint (4) is the reduced form of $p_2x_2 + \dots + p_nx_n \leq y + p_1x_1$, stating that expenses incurred in activities 2 through n cannot exceed money income (from property and transfer payments y , and current personal services p_1x_1 , where p_1 denotes the wage rate). The meaning of time constraint (5) is obvious. Constraint (6) is the reduced form of $w_1x_1 + w_2x_2 + \dots + w_nx_n \geq w$: in the case of, say, a local politician, election requires at least w votes; activity 1 is estimated to yield w_1 votes per unit of time spent at work (law practice or union activity, say), w_2 per unit of time spent at the grocery store, and so on. Put another way, the left side of (6) is a linear approximation to the assumed functional relationship $w = w(x_1, \dots, x_n)$ between votes obtained and time invested in alternative behavior settings. Such linearization is neither more nor less rebarbative in a social than in an economic context, where linear activity analysis (Koopmans, 1951) in general, and input-output tables (Leontief, 1951) in particular, are standard tools in approximating production functions.

Analogously, in the case of a research worker, w may express an output requirement (e.g., pages or papers published), and the w_j may denote estimated average yields from time spent in such behavior settings as work, professional contacts, and relaxation.

As illustrated by (4) to (6), the a_{ij} may denote inputs or outputs according as $a_{ij} > 0$ or < 0 . Furthermore, the b_i denote endowments or requirements according to whether $b_i > 0$ or < 0 .

Mathematical Properties of the Model

We make the standard assumption that u is concave (i.e., has the usual properties of risk aversion and nonincreasing returns). By the saddlepoint theorem (Uzawa, 1958), x^* solves (P)--assuming the Slater regularity condition: $Ax^0 < b$ for some $x^0 > 0$ --if and only if there is a real n tuple $v^* \geq 0$ such that (x^*, v^*) is a saddlepoint of the Lagrangian $L(x, v) \equiv u(x) + v(b - Ax)$; that is, if and only if

$$\begin{aligned}
 u(x) + v^*(b - Ax) &\leq u(x^*) + v^*(b - Ax^*) \leq \\
 u(x^*) + v(b - Ax^*) & \\
 \text{for all } x \geq 0, v &\geq 0.
 \end{aligned} \tag{7}$$

Clearly, the second inequality holds if and only if

$$v^*(b - Ax^*) = 0. \tag{8}$$

The coordinates x_j , v_i of x , v are called primal and dual variables, respectively.

The standard interpretation of v^* as a price system for endowments b_i (in terms of maximand u) is well known. Consequently, the solution of (P) implies the valuation of total endowment at

$$v^*b \equiv \sum v_i^* b_i = v_1^* y + \dots + v_m^* b_m. \tag{9}$$

We define

$$\begin{aligned}
 SI &\equiv \frac{v^*b}{v_1^*} = \frac{v_i^*}{v_1^*} b_i = \frac{v_1^*}{v_1^*} y \\
 &+ \frac{v_2^*}{v_1^*} b_2 + \dots + \frac{v_m^*}{v_1^*} b_m, \quad (v_1^* > 0), \tag{10}
 \end{aligned}$$

which evidently has the same dimension as y , namely, dollars.¹ Total income, including income from current personal services, is then $p_1 x_1^* + SI$. If u is known, the value of SI is given by (10).

Implications for Policy Models, Output Measurement, and Demand Analysis

A fully developed system of social accounts should enable us to address problems of growth, stability, and equity in terms of total income ($SI + p_1 x_1$) and each of its major components, $p_1 x_1$, y , and

¹Assuming $v_1^* > 0$ by (2), (8) implies that money constraint (4) is binding. Since v_1^* can be interpreted as the marginal utility $\partial u / \partial b_i$ of the i th endowment (proof in Van Moeseke, 1965), the assumption means that money is a scarce commodity for the individual.

(SI - y). Models of national economies would then be perceived as components of models of the social system as a whole. Tinbergen's (1952) "theory of economic policy" might be extended to include in quantitative models noneconomic as well as economic targets and instruments of national policy. At the least, attempts to estimate, in nonmoney as well as money terms, the costs to individuals associated with different combinations of inflation and unemployment might lead to revisions in the relative weights assigned to these targets in the objective functions of policy models. The same might be said of target and instrument variables generally. Similarly, the general Efficiency Criterion (Van Moeseke, 1968) may be redefined relatively to a decision space including noneconomic dimensions.

The allocation of an individual's resources among behavior settings also has considerable interest. Recall that utility u in our mathematical model depends only on x , the "life style" vector of proportions of the individual's time spent in the various behavior settings. In equilibrium, he pays "total prices" of r_j^*/v_1^* and r_k^*/v_1^* per unit of time spent in the j th and k th settings, respectively; these prices must stand in the same ratios as their marginal utilities:

$$\frac{r_j^*/v_1^*}{r_k^*/v_1^*} = \frac{\partial u}{\partial x_j^*} / \frac{\partial u}{\partial x_k^*} \quad (31)$$

Indeed, by the fourth (KT) conditions $x_j^*, x_k^* > 0$ implies equalities for the corresponding indices j, k in the third condition:

$$u_{x_j}^* = \sum_i a_{ij} v_i^*; \quad u_{x_k}^* = \sum_i a_{ik} v_i^* \quad (32)$$

Since $r^* = v^*A$, one has further, by the implicit-function rule:

$$-\frac{\partial x_k}{\partial x_j} = \frac{u_{x_j}^*}{u_{x_k}^*} = \frac{\sum_i a_{ij} v_i^*}{\sum_i a_{ik} v_i^*} = \frac{r_j^*}{r_k^*} \quad (33)$$

Note, further, that $r_j^*x_j^*/v_1^*$ can be regarded as as output or reward produced in setting j and valued at resource cost. In extended notation,

$r_j^* = \sum_i v_i^* a_{ij}$, and in dividing both sides of the equation by the marginal utility of money v_1^* , the cost of each resource is converted into dollars.

Our model requires that $r^*x^*/v_1^* = (v^*b)/v_1^*$. If we expand the endowment vector to include skill and health, thus including income from personal services $p_1x_1^*$ in $(v^*b)/v_1^*$, the equality states that the individual's total income ($SI + p_1x_1^*$) equals his total expenditures r^*x^*/v_1^* . The relation

$$(r_1^*x_1^* + r_2^*x_2^* + \dots + r_n^*x_n^*)/v_1^* = SI + p_1x_1^* \quad (34)$$

is formally analogous to the money income constraint in the theory of consumer choice. The dollar unit of measure applies to all individuals, and the equality holds when total income is aggregated over individuals.

Hence the demand for life styles (i.e., for occupancy of, and participation in, behavior settings) should be amenable to quantitative representation. The elasticity rules derived can be regarded as generalizations of corresponding rules in demand theory, and Frisch (1959) has shown that those rules have important consequences for models of national economies. In principle, time series observations on (1) the proportions of time allocated to specified categories of behavior settings, (2) the total costs per hour of occupying them, and (3) total income per capita, should permit us to estimate statistical demand functions for participation in each kind of behavior setting. In practice, an initial rough approximation to such functions might be based on a priori information. If n categories of behavior settings were used to classify total hours of living time per person per year, Frisch's approach would yield an $n \times (n + 1)$ matrix of elasticity coefficients with respect to the n measures of total price per hour and to total income per capita. Although some pairs of behavior settings might be complementary, competitive relationships would predominate. The $n + 1$ coefficients in each row would sum to zero. The n coefficients with respect to total income would have a weighted average of 1 and the $n \times n$ coefficients with respect to total prices per hour would have a weighted average of -1; the weight applied to all coefficients in the i th row would be the

proportion of total income that was expended on the *i*th category of behavior settings. An equal percentage increase in all total prices and in total income per capita would leave the allocation of time among behavior settings unchanged.

The present model applies to a single accounting period. It could be extended to deal with generalized human capital transactions and evaluation of policy interventions that affect the trajectory of the endowment vector over a period of years. The distinctly new and difficult problems would arise in implementing the suggested social accounts and verifying their usefulness initially for a single period. For example, (34) implies that dollar values could be assigned to the current behavioral outputs of universities, government agencies, and scientific communities, as well as to those of business firms!

To say that such things are possible is not to say that they are easy or that they will soon be achieved. The gap between aspiration and accomplishment may be closed from either direction.

Data Sources and Methods Used and Assumptions Made

Roger G. Barker observed the behavior of the residents of a small midwestern community of about 830 people over a period of several years. In fact, the methods, theories and data reported in his 1968 work issue from 20 years of research at the Midwest Psychological Field Station. He concluded that the community environment could be divided into parts or units called "behavior settings." These observations covered the settings that occurred outside the homes of the community; in other words, public behavior settings. The choice of behavior settings as units of measurement was influenced by the fact that various behavior settings coerce people and things to conform to spatio-temporal patterns. For instance, when we observe a high school

basketball game we can notice given patterns of behavior. The performers in the settings (the players and the viewers, etc. In the case of the basketball game, for example) make a deliberate attempt to ensure that there is this conformity and that the setting fulfills its function. Barker calls this aspect of a setting its program and notes that two settings may be considered as having identical programs when their parts and processes are interchangeable. In such an event two or more behavior settings, as the case may be, belong to the same behavior setting "genotype." Barker, Barker and Ragle [3, p. 159] note that "The number of behavior setting genotypes in a town is a measure of the variety of the town's environment." He identified 198 genotypes for his town of 830 people, e.g. grocery stores, hardware stores, kindergarten classes, religion classes, business meetings, etc. and 884 public behavior settings. He recorded the number of daily occurrences of behavior settings during 1963-64 at 53,258 and the hours of duration of each behavior setting and the number of participants therein enabled him to obtain a record of hours of occupancy totalling 1,129,295 in 1963-64.

Barker's [2] analysis also reveals the class of the performers in each setting by the degree of their involvement therein. This analysis, for instance, allows one to distinguish between a store manager and a customer in a store or between basketball players and the viewers. For instance a zone 6 participant means in his terminology single leader, zone 5 participants mean joint leaders, zone 4 means

active functionary, zone 3 means member or customer, zone 2 means audience or invited guest and zone 1 means an onlooker. The contributions to a behavior setting are also made by the participants in the descending order of their zone numbers, i.e., a zone 6 participant contributes more to a setting as compared to a zone 2 participant, in that setting.

Barker rates behavior settings in terms of five behavior mechanisms, affective behavior, gross motor activity, manipulation, talking and thinking on three subscales measuring extent, tempo and intensity of participation. He also rates the settings in terms of 11 action patterns viz: aesthetics, business, education, government, nutrition, personal appearance, physical health, professionalism, recreation, religion and social contact measuring participation, supply relationship, if any, to other settings, evaluation and appreciation and teaching and learning.

His analysis spans various authority systems, viz: business, churches, government, schools and voluntary associations.

He also identified the degree of local autonomy, implying whether decisions regarding appointment of performers, admission of members, establishment of fees and prices and formulations of programs and schedules were made within the town or outside the town but inside the school district, or outside the school district but within the county or outside the county but within the state or outside the state but within the nation.

He divided the residents of the community into 14 population subgroups, viz., infants, preschoolers, younger school, older school, adolescents, adults and the aged; male; female; social classes I, II,

III; white; negro. Our choice of behavior settings as units of measurement is influenced by the fact that in some cases a behavior setting is identical with a business firm, e.g., a barber shop, a small retail store, a service station, etc. It is also true that analysis in terms of behavior settings would allow us to establish the data requirements at the micro level. Firms already maintain accounting records in various forms, and it is not highly difficult to derive records of behavior setting occupancy therefrom. Behavior settings analyzed in terms of action patterns, behavior mechanisms, authority systems, etc. are likely to reveal the working of a social system in depth.

Fox [29, p. 19] opined that "His (Barker's) book Ecological Psychology (1968) is a rich source of ideas that may be useful in the development of social accounts, in measures of output applicable to both market and nonmarket systems, and in the specification of objective functions for both market and nonmarket institutions." Indeed, we found this to be true.

Barker [2, pp. 211-228] presents succinct descriptions of the programs of all 198 of the behavior setting genotypes which occurred in Midwest, Kansas in 1963-64; we reproduce here the programs of the 20 genotypes listed in Table 15.¹ The numbers in parentheses refer to zones within behavior settings. Thus, in Genotype 9, Attorneys Offices, lawyers in single practice are zone 6 leaders, lawyers operating in partnership are zone 5 co-leaders, secretaries are zone 4 functionaries, and clients occupy zone 3. The 20 programs follow:²

¹In our Chapter VI, p. 138.

²Reproduced from Barker [2, pp. 211-228].

9. Attorneys Offices. Lawyers (6 or 5) initiate legal actions, prepare legal defense in civil and criminal cases, give legal advice, draw up contracts, prepare wills, prepare federal and state income tax returns, manage office; secretary (4) carries out office routines; clients (3) seek and pay for advice and service.
15. Banks. President (6) manages all operations, makes loans, gives financial advice, provides credit information; vice-president (4) makes loans, sells insurance; cashier (4) cashes checks, receives deposits, provides access to safe deposit, keeps records; clerks (4) engage in office routines; bank examiners (4) come at intervals to examine the routines, the assets and liabilities of the bank in relation to legal standards; customers (3) deposit and withdraw money, arrange for or pay back loans, seek advice, use safe deposit boxes, and converse.
18. Basketball Games. Coach (6) or coaches (5) arrange games, instruct players; referees (4) judge plays; players (4) play according to standard basketball rules; cheerleaders (4) lead cheers; salesmen (4) sell popcorn, soft drinks; band (4) plays music in intervals; audience (2) watch, cheer, applaud, eat.
34. Cleaners, Dry Cleaning Plants. Owner-manager (6) manages business, cleans and presses clothes, waits on customers, accepts payment, sells insurance; helpers (4) assist manager in dry cleaning; customers (3) bring clothes to be cleaned, pick up clean clothes, pay for service.
54. Drugstores. Pharmacist (5) mixes and dispenses drugs according to prescription issued by physician, manages drug and general variety store; manager (5) manages cosmetic, jewelry departments and fountain; sales persons (4) sell and serve customers at counters or fountain, wash dishes, mix drinks; customers (3) select, buy, pay for merchandise, eat food, converse.

58. Elementary School Basic Classes. Teacher (6) teaches reading, grammar, arithmetic, writing, elementary health, social studies, science and engages in classroom routines; pupils (3) listen, write, recite, read, figure.
81. Government Offices: Business and Records. Elected or appointed government official (6) manages office, is responsible for records and accounts, answers questions, confers with county commissioners or other boards, works as required by law; clerks (4) carry out office routines; customers (3) pay fees, obtain information.
83. Grocery Stores. Manager (6) manages business, prices goods, prepares advertising, takes inventories; cashier (4) totals charges, takes money; butcher (4) cuts meat, serves customers, stocks meat case, weighs meat; stock clerk and carry-out boy (4) stock shelves, mark price on merchandise, carry out sacks to customer's car; salesman, wholesale (4), interview manager; customers (3) select goods from shelves and cases, pay for merchandise.
85. Hardware Stores. Owner-manager (6) manages business, sells merchandise, repairs appliances; assistants (4) work with manager; customers (3) inspect and buy goods, pay for service; onlookers (1) watch TV, converse.
117. Meetings, Business. President or chairman (6) presides at meeting and conducts it in general accordance with Roberts' Rules of Order; secretary (4), treasurer (4), committee chairmen (4) engage in prescribed work; members (3) participate in meeting according to prescribed rules.
157. Religion Classes. Teacher (6) or teachers (5) conduct short worship service, teach about church history, doctrine, the Bible, lead discussion; class members (3) listen, study, discuss, pray, contribute money.

161. Religious Worship Services. Minister (6) or Sunday school superintendent (6) prays, speaks, reads scripture; minister (6) performs rituals, e.g., baptism, organist (4) or pianist (4) plays instrument, choir director (4) directs choir; choir members (4) sing; ushers (4) seat congregation, take up collection; candlelighters (4) light and extinguish candles; members (3) and visitors (2) listen, sing, pray.
162. Restaurants and Organization Dinners for the Public. Cafe proprietor (6) or proprietors (5), school lunchroom manager (5) and principal (5), organization chairman (5) plan, order food, establish prices, may aid in cooking and serving food; assistants (4) cook and serve food, clean up; customers (3) eat, pay for food, converse.
177. Service Stations. Manager (6) manages business, fills tanks of cars and trucks with gasoline, checks oil, water, and tires, washes windshields, changes oil, greases cars, sells accessories; assistants (4) service cars as prescribed; customers (3) buy gasoline, oil, accessories, pay for servicing.
191. Street Fairs. Chamber of Commerce committee (5) arranges for carnival, provides facilities; carnival manager (5) directs placement of concessions, deals with committee; concessionaires (4) set up own concession or ride, take tickets, act as barkers, give prizes; ticket sellers (4) sell tickets usable at any concession; food sellers (4) sell popcorn, cotton candy, hot dogs; customers (3) ride on equipment, try games of skill, buy and eat food, stroll about, converse.
194. Taverns. Owner-manager (6) manages business, serves beer, accepts pay, converses; assistant (4) helps in serving customers; customers (3) drink, converse, play pinball machine, play juke box, pay.

203. Trafficways. City employees (4) repair streets; city marshall (4), county sheriff (4), and state traffic officers (4) enforce traffic regulations; pedestrians (2) walk on streets and sidewalks; automobile drivers (2) drive on streets; children (2) play in streets.
208. Variety Stores. Owner-operators (5) manage store, sell merchandise, interview wholesale salesmen, stock shelves; clerk (4) sells merchandise; customers (3) look, select, buy, converse.
217. Welfare Offices. Welfare director (6) manages office, interviews clients, works with county commissioners and state welfare officers, makes reports, presides at staff conferences; welfare workers (4) interview clients, implement law; secretaries (4) engage in office routines; clients (3) come to see welfare workers, get information, assistance.
219. Woodworking and Machine Shop Classes. Teacher (6) teaches skills and theory of working with wood, demonstrates proper use of tools, teaches reading and drawing of plans, engages in classroom routines; students (3) work with wood, engage in mechanical drawing, study.

Barker's data sheet for high school basketball games is reproduced below:

Name: High School Boys Basketball Game			
Genotype #	1-3: 0·1·8	Genotype Commonality # 8: 9	Locus 16: 1
B S #	4-6: 0·0·5	Authority System 13-14: 0·1	No. of Occurr. 17-19: 0·0·8
Genotype Date	7: 3	Class of Authority Systems 15: 4	Survey # 20: 5

Occupancy Time of Town Subgroups				Max. Penetration of		ACTION	
Group	No. P	Hours	OT Code	Group	Subgroups	PATTERN RATINGS	
Inf	3	24	21-22: 0.4	Inf	27: 1	Aes:	53: 0
Presch	12	54	23-24: 0.5	Presch	22: 2	Bus	54: 1
Y S	10	87	25-26: 0.6	Y S	23: 2	Prof	55: 1
O S	18	258	27-28: 0.9	O S	24: 4	Educ	56: 1
Town Child	43	423	29-30: 1.1			Govt	57: 1
Adol	63	1720	31-32: 1.7	Adol	25: 4	Nutr	58: 1
Adult	72	1676	33-34: 1.7	Adult	26: 5		
Aged	7	81	35-36: 0.6	Aged	27: 2	PersAp	60: 2
Town Total	185	3900	37-38: 2.3	Grand Max	28: 5		
Males	97	2264	39-40: 1.9	Males	29: 5	Physh	62: 2
Female	88	1636	41-42: 1.7	Females	30: 4	Rec	63: 8
I	35	600	43-44: 1.2	I	31: 4	Rel	64: 0
II	105	2236	45-46: 1.9	II	32: 5	Soc	65: 6
III	42	1014	47-48: 1.4	III	33: 4	MECHANISM RATINGS	
N-G	3	50	49-50: 0.5	N-G	34: 4	AffB	66: 9
						GroMot	67: 7
POPULATION (number)				PERFORMERS (number)		Manip	68: 7
Town Child			51-53: 0.4.3	Town Child	35-36: 0.1	Talk	69: 9
Out Child			54-56: 1.8.7	Out Child	37-38: 0.0	Think	70: 4
Total Child			57-59: 2.3.0	Tot Child	39-40: 0.1	GEN RICH 71-72: 23	
Town Total			60-62: 1.8.5	Town Child	41-42: 5.3	PRESSURE RATING	
Out Total			63-65: 9.3.7	Out Total	43-45: 2.4.9	Children	73: 4
Grand Total			66-69: 1.1.2.2	Grand Total	46-48: 3.0.2	Adolesc	74: 2

Grand O.T. (code)	70: blank 71-73: 0.3.1	Perf/ Pop	49-50: 2.7	Children 75: 0
Total Duration	74-77: 0.0.2.4	Aver. No.	51-52: 8.4	WELFARE RATING Adolesc 76: 3
Average Attendance	78-80: 3.6.3			AUTONOMY RATING std 79: 7

Some features which make this data sheet useful for social accounting are as follows:

1. The data relate to a nonmarket system.
2. Occupancy times have been recorded for the town's population by age, sex, socioeconomic status, and color and by zone of maximum penetration, zone 6 representing single leader; zone 5 representing joint leaders; zone 4 active functionaries; zone 3 customers; zone 2 audience; and zone 1 onlookers.

These records are useful for social accounting purposes, because all the participants in the program of a behavior setting bring in their inputs to the setting and receive rewards from the setting.

In the case of the high school boys' basketball game, adult referees operating in zone 5 control the setting; adolescent basketball players in zone 4 implement the program of the setting; persons of all age groups, including younger children and the aged, comprise the audience and are zone 2 participants; and the few infants present are onlookers or zone 1 participants.

¹Data sheet for high school boys' basketball game. Source: Reproduced from Barker [2, p. 99].

3. The data sheet also shows ratings for each of 11 action patterns, namely, aesthetics, business, professionalism, education, government, nutrition, personal appearance, physical health, recreation, religion and social contact. The game, being basically a recreation activity, gets a high rating of 8 on recreation. It also makes room for social contact for the people and as such, we find a moderately high rating of 6 on that action pattern, and the other nine action patterns being relatively unimportant in this case the ratings therefor are rather low.

4. The data sheet also contains a rating for each of the five behavior mechanisms, namely, affective behavior, gross motor activity, manipulation, talking, and thinking. It is common to notice a great amount of elation, shouting, clapping and talking in such games and we find very high ratings of 9 (the highest possible rating being 10) on affective behavior and talking. The players exert themselves and manipulate the ball and that is why the ratings on gross motor activity and manipulation are 7, a fairly high rating. The rating on thinking is 4.

Use has been made of the Fox-Barker data set. In addition to 1970 census data on social and economic characteristics of the population of the United States, we have used the Survey Research Center, University of Michigan data on American's Use of Time in 1975-76 (which are based on a probability sample of U. S. adults representing the entire noninstitutional population aged 18 and over). The SRC data allow us to establish a link between Barker's behavior setting survey

and the Fox-Van Moeseke model, as the SRC time-use diaries cover 24 hour days and hence include household as well as nonhousehold activities. Several publications of the U. S. Department of Labor have also proved to be of value for the purpose of this research (e.g., the Dictionary of Occupational Titles, (DOT) [106; 107] and the Handbook for Analyzing Jobs (HAJ) [108]).

The HAJ is devoted to an explanation of the procedures and techniques used in the public employment service.

"In the U. S. Training and Employment Service job analysis involves a systematic study of the worker in terms of:

What the worker does in relation to data, people and things
(worker functions).

The methodologies and techniques employed (work fields).

The machines, tools, equipment and work aids used (MTEWA).

The materials, products, subject matter or services which result
(MPSMA).

The traits required for the worker (worker traits)," (HAJ) [108, p. 1].

The Dictionary of Occupational Titles [106; 107] makes available descriptive information concerning most jobs in the American economy and hence, such information can be readily used for employed and self-employed individuals residing in Barker's town of Midwest.

The dictionary provides a definitive basis for the development of statistical analysis of occupations. Blau and Duncan [13, pp. 6-7] had pointed out that a close relationship exists between occupations and social stratification. They believe that:

The occupational structure in modern industrial society not only constitutes an important foundation for the main dimensions of social stratification but also serves as the connecting link between different institutions and spheres of social life and therein lies its great significance. The hierarchy of prestige strata and the hierarchy of economic classes have their roots in the occupational structure; so does the hierarchy of political power and authority, for political authority in modern society is largely exercised as a full-time occupation....The occupational structure also is the link between the economy and the family, through which the economy affects the family's status and the family supplies manpower to the economy. The hierarchy of occupational strata reveals the relationship between the social contributions men make by furnishing various services and the rewards they receive in return, whether or not this relationship expresses some equitable functional adjustment.

The Fox-Van Moeseke model recognizes this. According to an extension of the model in Fox and Ghosh [33]:

$$A_h x_h = b_h$$

where b_h is the resource vector of individual h , A_h denotes a matrix with typical element a_{ij} showing the amount of the j th resource required per unit of time spent in the i th behavior setting and x_h is the time allocation vector. We would, therefore, be in a position to estimate the behavioral capacities which in the end produce "total income" for each member if we can associate a resource vector. The model views a worker as selling his work-related skills in a conventional labor market which is the focus of reference in the Dictionary of Occupational Titles [106, 107] and the Handbook for Analyzing Jobs [108].

We know that a specific job requires a worker to perform certain activities required by the program of a behavior setting. The setting implies environmental conditions, pleasantness or unpleasantness of the work, extremes of heat or cold, wetness or humidity, noise and/or vibration, and hazards; location of work (inside, outside or both); and physical demands made by the job. The job could involve sedentary work, light work, medium or heavy work, etc. The job also requires the worker to function at specified levels of complexity on the data-people-things hierarchies. The job can be classified into a work field organized by specific methods characterized by machines, tools, equipment or work aids, directed at common technological objectives. In addition the job can be related to the Standard Industrial Classification System. Tenure in a job would imply that a worker has certain interests and temperament which are in overall conformity with his line of work. The job also requires that the worker have certain levels of general educational development and specific vocational preparation and demands certain types of aptitudes.

Occupational prestige may be viewed as the by-product of the pursuit of a satisfying life style. An employed adult spends over 30 percent of his waking hours at his job. If the allocation of his time among various behavior settings, public and private, defines his life style, then the job choice is an influential factor therein and a job is not merely a means of earning money or occupational prestige.

Another reason for the use of the information contained in the Dictionary of Occupational Titles [106, 107] and the Handbook for

Analyzing Jobs [108] is that several volunteer roles escape quantification in national income accounts, but these may very well correspond to paid roles elsewhere in the economy. Imputation of values of total behavioral income or total income under the Fox-Van Moeseke model is facilitated by associating volunteer roles in churches, schools, and voluntary associations with paid equivalents of such roles in business, industry and government. There exist paid counterparts for amateur athletes, actors, musicians, cooks, household workers, etc. and the roles are defined in the DOT-IIAJ framework.

In the resource vector we are considering four behavioral capacities: capacity for affective behavior, gross motor activity, psychomotor activity and cognitive capacity. This is in consonance with Durnin and Passmore [23], Bloom [14], Krathwohl et al. [56], Harrow [44], and Barker and others [6; 2; 5].

While the behavioral capacities contained in the resource vectors of the individuals in the community are inputs to the social system the rewards that individuals receive are outputs of the social system. We have classified rewards into three broad groups, extrinsic, intrinsic, and concomitant. Zytowski [113] is supportive of this categorization.

Behavioral capacities may be interpreted as follows:

Affective behavior is present within a behavior setting to the extent that the concrete occurrences which constitute its program involve inhabitants in the overt expression of feelings and emotions (Barker and Schoggen) [5, p. 170].

The Handbook for Analyzing Jobs [108, p. 233] refers to the following aptitudes as reflections of cognitive capacity: intelligence
G = general, V = verbal, N = numerical, S = spatial, P = form perception; Q = clerical perception, C = color discrimination--these constitute seven of the eleven aptitudes considered in the handbook. The other four aptitudes are: K = motor coordination, F = finger dexterity, M = manual dexterity, E = eye, hand and foot coordination.

We have sought to associate each occupation with a six digit DOT code. The last three digits refer to the levels of the job envisaged in the occupation with respect to data, people and things. The DOT allows us to define physical demands or the proxy variable for gross motor activity. The level of the job with respect to data processing roughly corresponds to the cognitive capacity called for. The level of the job with respect to people appears to be linked to the capacity for affective behavior and the level of the job with respect to things appears to be linked to psychomotor activity like Barker's "manipulation."

Extrinsic rewards include money, prestige, security, achievement, advancement and recognition--"the outcomes of work." Intrinsic values or rewards are part of the job itself and include independence, altruism, creativity, intellectual stimulation, etc. Concomitant values or rewards include surroundings, working conditions, company policy and administration, interpersonal relations with peers, subordinates and superiors, dominance, leadership, etc.

Total income or total behavioral income may be defined as the product of average hourly earnings on the job times waking hours per year. We are assuming that:

- a) average hourly earnings on the job reflects the individual's behavioral capacity.
- b) an individual spends his behavioral capacities at the same rate on his job as on other activities throughout the day.
- c) the worker sells his work-related skills in a conventional labor market. The labor market is competitive and under constant returns to scale, the wages equal marginal physical productivity. This, being determinate, can be used to estimate behavioral capacity.
- d) the following allocation factors hold. These estimates are a priori estimates, but appear realistic enough for our compilation of the pilot set of accounts. For adults, we have assigned 20 percent of total income each to psychomotor activity (z_{psm}), gross motor activity (z_{gm}), and affective behavior (z_{aff}) until total income reaches and passes \$20,000. After that point z_{gm} , z_{aff} , and z_{psm} each remains fixed at \$4,000. We have estimated hourly earnings on the basis of a regression equation fitted to U. S. Census data for 1970. According to this equation, average hourly earnings reach about \$3.757 at age 19 with 13 years of schooling for a male; this figure multiplied by total waking hours yields a total income of \$22,000. The above assumption

implies our belief that as of 1969 (U. S. Census figures for 1970 are based on 1969 earnings) the labor market would not pay more than \$4,000 for sheer muscular activity or unspecialized psychomotor activity or affective capacities without any specific vocational preparation. Beyond this level payment appears to be associated with the increases in cognitive capacity.

Table 1. The allocation factors

Population sub-group	Proration factors for total income					
	Age	z_{cog}	z_{aff}	z_{psm}	z_{gm}	Σz
Infants	0	.20	.40	.20	.20	1.00
	1	.20	.40	.20	.20	1.00
Preschool	2	.30	.30	.20	.20	1.00
	3	.30	.30	.20	.20	1.00
	4	.30	.30	.20	.20	1.00
	5	.30	.30	.20	.20	1.00
Younger school	6	.35	.25	.20	.20	1.00
	7	.35	.25	.20	.20	1.00
	8	.35	.25	.20	.20	1.00
Older school	9	.35	.25	.20	.20	1.00
	10	.35	.25	.20	.20	1.00
	11	.35	.25	.20	.20	1.00
Adolescents	12	.40	.20	.20	.20	1.00
	13	.40	.20	.20	.20	1.00
	14	.40	.20	.20	.20	1.00
	15	.40	.20	.20	.20	1.00
	16	.40	.20	.20	.20	1.00
	17	.40	.20	.20	.20	1.00
Adults	18	.40	.20	.20	.20	1.00
	19 and over	[Total Income minus \$12,000]	\$4,000	\$4,000	\$4,000	[\$ Total Income \geq \$20,000]

e) our computations of waking hours are based on estimates which are close to the SRC survey of time use in 1975-76 for some categories. For children our estimates are based on a priori knowledge. The basic line of logic that runs through our estimates is that during the early years of life to adolescence the hours of sleep gradually fall from 16 hours or two-thirds of the total living time in a day for a newborn infant to 9 hours or slightly more than a third for persons in the age group 10 through 17, while most adults (aged 18 to 54) sleep 8 hours per day and people beyond age 54 need greater amounts of sleep and rest. We have considered 366 days a year, that is, a total of 8784 hours in order to ensure conformity with Barker's data and the SRC data which in four waves covered a 366-day period. We have converted SRC time use data in minutes per "synthetic week" of $7 \times 24 \times 60 = 10080$ minutes into hours per 366 day year.

Table 2. Estimates showing hours of sleeping and waking for a 366 day year

Age	Hours of sleep per day	Hours per 366-day year	
		Sleeping	Waking
0	16	5856	2928
1	14	5124	3660
2-3	12	4392	4392
4-5	11	4026	4758
6-9	10	3660	5124
10-17	9	3294	5490
18-54	8	2928	5856
55-64	9	3294	5490
65 and over	11	4026	4758
Nursing home occupants	16	5856	2928

f) our estimates of average hourly earnings are based on a regression run on U. S. Census data. We ran a series of regressions with income as the dependent variable and other demographic variables and economic variables as independent variables and decided that the following equation was reasonably suited to our present requirements:

$$X_{34} = -0.07520 + 0.04471 X_5 + 0.00362 X_7$$

$$(0.03410) \quad (0.00174) \quad (0.00060)$$

$$\bar{R}^2 = .607$$

where X_{34} = logarithm of average hourly earnings of males;

X_5 = median years of schooling of males; and

X_7 = median age of males.

The figures in parentheses are standard errors; the corresponding t-ratios are 2.2 for the intercept term, 25.7 for the coefficient of X_5 , and 6.0 for the coefficient of X_7 . Interpretation of the regression relationship: X_{34} being a logarithm, its antilog (average hourly earnings in dollars) will be positive even when $X_7 = 0$ and $X_5 = -6$. These two values for X_7 and X_5 have some significance. Usually a child in the U. S. and for that matter in most countries starts going to school at age 6 and begins his or her formal education. But he does receive education from the behavior of adults he comes into contact with during the six years prior to commencement of his formal schooling. Hence, it seems reasonable to specify that at birth, his

years of schooling = -6, at age 1, it equals -5 and so on until age 6 when his schooling (formal) = 0. This interpretation allows us to consider not only formal schooling, but also informal learning which is nevertheless an integral part of the educational process which begins at birth.

The equation implies that for each year of schooling average hourly earnings increase by about 10.8 percent and for each additional year of age, average hourly earnings increase by about 0.8 percent.

For instance, for a person aged 18 with 12 years of schooling

$$X_{34} = -0.07520 + (0.04471)12 + (0.00362)18 = 0.52648;$$

the antilog is \$3.361 per hour.

However, if he had 13 years of schooling at age 18

$$X_{34} = -0.07520 + (0.04471)13 + (0.00362)18 = 0.57119, \text{ and}$$

the antilog is \$3.726 per hour; the percent increase is 10.86.¹

If he had 12 years of schooling but was 19 years old

$$X_{34} = -0.07520 + (0.04471)12 + (0.00362)19 = 0.53010, \text{ and}$$

the antilog is \$3.389 per hour; the percent increase is 0.83.²

The total effect of an increase in both age and years of schooling by one year in each case is an increase in earnings

¹A more precise calculation based directly on the regression coefficient gives 10.84 percent.

²A more precise calculation based directly on the regression coefficient gives 0.84 percent.

by about 11.8 percent. A person aged 19 with 13 years of schooling would have average hourly earnings of \$3.757 as compared to the average hourly earnings of \$3.361 of an 18 year old with 12 years of formal education. This appears to be consistent with the real world situation. Mere increase in age, which is a proxy variable for experience, by one year does not increase earnings as rapidly as does an additional year of schooling which likely culminates in the acquisition of additional skill or sharpening of existing skill.

Some illustrative calculations on the basis of the above equation follow:

Table 3. Examples of computations of average hourly earnings

<u>Age</u>	<u>Years of schooling</u>	<u>Average hourly earnings or "behavioral capacity"</u>		
0	-6	\$0.453		
2	-4	0.566		
4	-2	0.708		
6	0	0.884		
8	2	1.105		
10	4	1.380		
12	6	1.724		
14	8	2.154		
16	10	2.690		
18	12	3.361		
	<u>Years of schooling</u>	<u>Age</u>		
		<u>30</u>	<u>40</u>	<u>50</u>
		<u>Average hourly earnings</u>		
	6	\$2.003	\$2.177	\$2.366
	8	2.461	2.675	2.907
	10	3.023	3.286	3.572
	12	3.715	4.038	4.389
	14	4.564	4.961	5.392
	16	5.607	6.095	6.625
	18	6.889	7.488	8.139
	20	8.464	9.200	10.000

- g) for the purpose of these computations we have used money earnings from work-related activities to the exclusion of income from property and transfer payments.
- h) we are assuming that until age 18 the average hourly earnings computations shown in Table 3 hold for both sexes.
- i) for females 18 years old and over, we are using the ratio of average hourly earnings of females to males in the Census data on 1969 earnings. There are differences between males and females in the Census data in terms of mean earnings, hours worked per 50 week year, hourly earnings (hourly earnings of females average 0.72 times hourly earnings of males), median years of schooling, median age, percent of black workers and percent of government workers, etc. The differences between median years of schooling, median age, percent of black workers and percent of government workers, however, are too small to explain much (if any) of the earnings differential. For the descriptive purpose of this work we have chosen to use the 0.72 ratio. A detailed examination of the reasons for earnings differentials between the two sexes would require further studies and at this point in time I am inclined to leave this task to the future.

For every female 18 years and older in the Fox-Barker data set we have calculated average hourly earnings for a male with the same age and years of schooling and multiplied the resultant figure by 0.72 to obtain the average hourly earnings of the female in question.

We have frozen z_{aff} , z_{psm} , and z_{gm} at \$4,000 each when total income equals or exceeds \$20,000 for females, and this is consistent with our treatment of the males and is based on the same rationale.

- j) we have proceeded to quantify intrinsic and concomitant rewards and extrinsic rewards other than money on the following basis: we are assuming that an individual is able to compare money and other extrinsic rewards and can
- k) assign dollar values to such extrinsic rewards as (for example) satisfaction from election to the school board. This is to say, we are assuming that the individual is able to say how much more money income he would need to yield the same satisfaction level as that yielded by his present income plus his election to the school board.

We are also assuming that the individual can compare one intrinsic reward to another. This may be traced via his revealed preference. He may prefer the action patterns in some settings, to those in others.

To evaluate concomitant rewards we may proceed as follows:

- (a) compare two behavior settings with (i) the same extrinsic rewards (ii) same or similar intrinsic rewards and (iii) requiring the same number of participants to man zones 6 through 1; (b) assume that the individual can assign numerical ratings to various differences between the two settings in terms of office space and layout (lighting,

decor, attractiveness, newness, efficiency of office machines and equipment, nature of managerial and administrative policy, etc.).

These assumptions, in our view, are not unrealistic. Premiums are paid by employers for hazardous and/or unpleasant work, other things being equal. Premiums are paid in educational institutions to faculty members who agree to handle administrative work in spite of their preference for teaching and/or research. Frequently, when a commercial organization relocates an employee as a matter of deliberate company policy, premiums are offered in one form or another.

A person may choose to accept one job in preference to another, given the same money income, based on his evaluation of nonmoney extrinsic rewards and intrinsic and concomitant rewards. A faculty member in a university may choose from among various combinations of teaching and research time sharing based on his evaluation of these non-money rewards and so on.

If we assume that the individual's utility or satisfaction level is a function of the three kinds of rewards, intrinsic, extrinsic, and concomitant:

$$U = f(q_{ex}, q_{in}, q_{con})$$

where q_{ex} = extrinsic rewards, q_{in} = intrinsic rewards, and q_{con} = concomitant rewards and that the individual has specified levels of

behavior capacities, viz z_{cog} or cognitive capacity, z_{aff} or capacity for affective behavior, z_{psm} or capacity for psychomotor activity and z_{gm} or capacity for gross motor activity, his effort at constrained optimization would imply his selection of such behavior settings as would maximize his rewards or total income given the inputs of capacities he can make into them.

The conventional market system allows us to arrive at average hourly earnings for each occupation and there is a quasi-market which assigns levels of occupational prestige. "Nam scores" [103] and Blau and Duncan scores [13] are evidence of this evaluation process. Hence, in principle, prices do exist for extrinsic rewards. Creative artists in the performing arts, for example, are frequently found to be willing to accept a lower money income coupled with the prospect of creative work in preference to higher money income and no scope for creative work. A self-employed business man may willingly work longer hours and accept a lower money income per hour as compared to an employed salaried business manager for the sake of being his own boss. Hence, there are external manifestations of the implicit prices of intrinsic rewards as well. Particular firms may earn bad reputations in local labor markets and this may cause them a higher staff turnover in comparison to other firms operating in the same labor market. Hence, implicit prices of concomitant rewards may also be derivable upon careful analysis. While extrinsic rewards are consumed by the individual "off the premises," intrinsic and concomitant rewards are consumed on

the premises and as such may frequently elude observation. This is probably the reason why they have not been considered in the mainstream of economic theory so far.

If we define shadow prices for behavioral capacities, v_{cog} , v_{aff} , v_{psm} , and v_{gm} we may be able to express the individual's situation as follows:

$$q_{ex}p_{ex} + q_{in}p_{in} + q_{con}p_{con} = z_{cog}v_{cog} + z_{aff}v_{aff} + z_{psm}v_{psm} + z_{gm}v_{gm}.$$

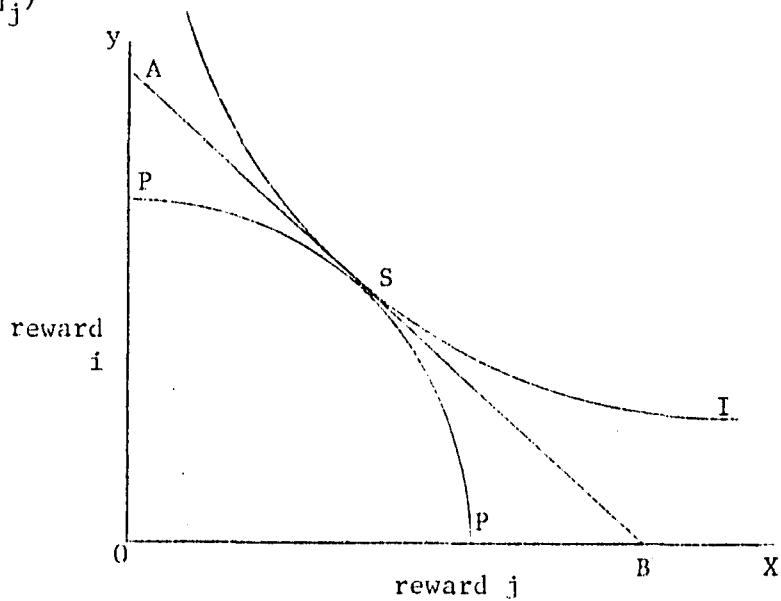
The individual makes available his behavioral capacities and the social system uses these as inputs. Rewards emerge from the social system as its outputs. Consistent with economic theory we may graphically represent the solution on a two-dimensional plane:

PP = production possibilities curve;

AB = budget line (slope = $-\frac{P_i}{P_j}$); and

I = individual's indifference curve defined by utility function

$$U = f(q_i, q_j)$$



The economic implications of the tangency solution at S are:

$$\frac{\partial u}{\partial q_i} / \frac{\partial u}{\partial q_j} = \frac{P_i}{P_j} = \frac{MC_i}{MC_j},$$

and when we consider three rewards, extrinsic, intrinsic and concomitant, these relationships would hold for pairwise comparisons under conditions of perfect competition. The approach lays emphasis on the earned income component of total money income to the exclusion of transfer payments and income from property. The underlying rationale is that existing economic accounts and the data bases used therefor are already highly developed and are a result of tremendous investments of time, effort, energy and money and are capable of analyzing the details of money income fairly well. The focus on nonmoney components of total income which was conspicuous by its absence is being introduced via the Fox-Van Moeseke approach.

The Fox-Barker data set comprises the construction of a microdata set representing a community of 1500 people. The 1500 individuals and their 495 households are completely hypothetical. Barker's 1963-64 survey data are detailed and explicit with respect to the 830 residents of the town of Midwest. The breakup was as follows:

<u>By sex</u>		<u>By socioeconomic class or caste</u>	
Males	415	I (Warner's upper middle) class	73
Females	415	II (Warner's lower middle) class	438
	830	III (Warner's upper lower) class	293
		Nonwhites	26
			<u>830</u>

By age groups

Infants (ages 0-1)	13
Preschoolers (ages 2-5)	53
Younger school children (ages 6-8)	46
Older school children (ages 9-11)	47
Adolescents (ages 12-17)	84
Adults (ages 18-64)	411
Aged (ages 65 and over)	<u>176</u>
	830

The Fox-Barker data set covers the entire community of 1500 people (embracing the town and the trade area) as follows: 830 town residents are accounted for in 285 households and a nursing home, 114 farm operator households account for 370 residents and 95 non-farm households account for the remaining 300 residents. (For details: refer to Tables 9.1 through 9.4 in Measurement and Valuation of Social System Outcomes, Chapter 9, Vol. I, edited by Karl A. Fox, Iowa State University, Ames, Iowa, 1979.) Fox assigned job roles to the members of the community in consonance with Barker's survey results.

The Fox-Barker data set includes an exhaustive allocation of 8784 hours of living time by each of the 1500 individuals. To link the set to official data systems, SIC (Standard Industrial Classification) codes have been assigned to those settings which provide gainful employment, including self-employment and DOT (Dictionary of Occupational Titles) six-digit occupational codes have been assigned to the 600 or so jobs in the community.

The following chapter contains a pilot set of accounts, which is in its elemental form. Detailed analysis of the household sector has not been presented. We have assumed that a comprehensive set of behavior

settings covering total living time can be developed, that is to say, that there exist not merely the public behavior settings reported by Barker, but also household behavior settings. Given this assumption we have set out to show how total income accounts may be arrived at.

CHAPTER VI. PILOT SET OF ACCOUNTS
FOR A SMALL COMMUNITY

Barker's survey was conducted during 1963-64 and the regression equation used by us for estimating average hourly earnings was based on 1970 Census data. Therefore, we will begin by examining the national income and product accounts for 1970:

Table 4. GNP and its major components, 1970 (\$ billion)^a

		% of GNP
Gross National Product (GNP)	\$974	100
Personal Consumption Expenditures	616	63.24
Durable Goods	89	9.14
Nondurable Goods	265	27.21
Services	262	26.89
Gross Private Domestic Investment	135	13.86
Business Fixed Investment	102	10.47
Structures	37	3.80
Producers' Durable Equipment	65	6.67
Residential Structures	30	3.08
Change in Business Inventories	3	0.31
Net Exports of Goods and Services	4	0.41
Exports	63	6.47
Imports	59	(6.06)
Government Purchases of Goods and Services	219	22.49
Federal	97	9.96
National Defense	75	7.70
Other	22	2.26
State and Local	122	12.53

^aSurvey of Current Business, July, 1971 [105].

Table 5. GNP by type of income, 1970 (\$ billion)^a

Gross National Product (GNP)	\$974
Less Capital Consumption Allowances	88
Net National Product (NNP)	886
Less Indirect Business Taxes	93
Business Transfer Payments	4
Statistical Discrepancy	-5
Plus Net Subsidies to Government Enterprises	2
National Income (NI)	796
Compensation of Employees	602
Proprietors' Income	67
Rental Income of Persons	23
Corporate Profits	71
Net Interest	33

^aSurvey of Current Business, July, 1971 [105].

Table 6. Allocation of GNP on the income side, 1970 (\$ billion)^{a, b}

GNP	\$974		\$974
Less Capital Consumption Allowances	88		
NNP	886		
Less Indirect Business Taxes	93		
Business Transfer Payments	4		
Statistical Discrepancy	-5		
Plus Net Subsidies	2(-)		
NI	796		
Less Net Business Saving	12		
Corporate Profits Tax	34		
Contributions for Social Insurance	58		
Plus Government Transfer Payments	76(-)		
Government Interest	15(-)		
Personal Interest	17		
Business Transfer Payments	4		
Personal Income (PI)	804		
Less Personal Tax Payments	116		
Disposable Personal Income (DPI)	688		
Less Personal Saving	54		
Transfers to Foreigners	1	R _f	
Personal Interest Payments	17		
Consumer Expenditure	616	C	615

^aSurvey of Current Business, July, 1971 [105].

^bC = consumption, S = saving, T = taxes, and R_f = transfers to foreigners.

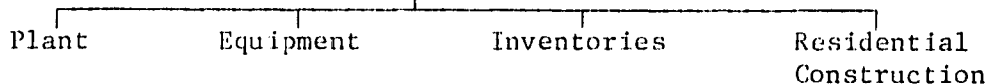
The purpose of including some of the tables from the National Income and Product Accounts is to demonstrate that, as of now, they are fairly sophisticated and that consistent methods have been followed for arriving at these accounts. The principles followed for preparation of these accounts are: (a) aggregation of like items as far as practicable; (b) measurement of expenditure and income streams emanating from current production of goods and services (transfer of ownership of assets within the economy or intermediate demand considered inconsequential); (c) valuation of output at market prices; and (d) total input is measured in terms of factor income and value added:

$$\text{GNP} = \text{Final Products Total} = \text{Factor Payments Total}$$

$$C + I + G + (X - M) = C + S + T + R_f$$

where C = consumption expenditure

I = investment expenditure



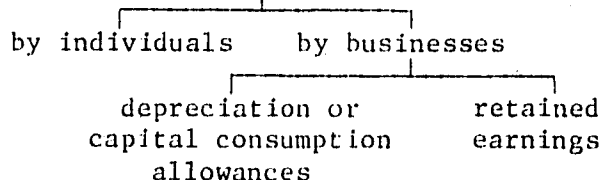
G = government purchases

(X - M) = net exports

T = net tax payments

= tax receipts minus transfer payments, interest, subsidies, etc.

S = total saving



R_f = net transfer payments to foreigners.

Examples of the detailed accounting entries required to arrive at these accounts can be seen in Bray [15] and others. Accounts of this type can in principle be drawn up at lower levels of aggregation. Barnard [8] has attempted to design and use social accounting systems at the state level; Leven, Legler and Shapiro [60] have considered the relationship of accounting systems to regional research; Leven [59] has offered a treatise on the theory and method of Income and product accounts for metropolitan areas; Fox [26] suggested how detailed economic accounts could be drawn up to facilitate area development research; Fox and Kumar [35, p. 55] elucidated the functional economic area concept and asserted that this concept "should be used as a major (probably the major) subnational building block in the nation's network of economic and social data and that it should be used explicitly for analyzing and implementing economic development programs of a type which rely heavily on local initiative and local recognition of mutual interest."

The economic accounts are based on accounts prepared at the micro level and imputations are made where complete records are not available. While individuals do not systematically maintain accounts and this makes our analysis of the household sector difficult, accounts and financial information systems do exist in the business enterprise sector. We have reviewed several publications by the Small Business Administration [87; 88; 89; 90; 91; 92; 93] in order to bring out the typical flavor of these accounts.

Financial Information Systems and Conventional Accounts
for the Business Enterprise Sector

If we characterize business enterprises by the predominance of the profit motive it would seem necessary to have such a financial information system therein as would reflect: a) amount of business being done during the period under review; b) cost of production of goods and services by product lines, territories, customers/customer groups, production processes, departments or responsibility centers, avoidable and unavoidable costs/controllable and uncontrollable costs, in historical terms as well as in constant dollars and by cash heads like wages, salaries, interests, etc., and noncash heads like depreciation and bad and doubtful debts written off being considered irrecoverable; c) net result in terms of revenue, being either a net profit or excess of income over expenditure or a net loss being an excess of expenditure over income; d) statement of receivables arranged by age and customers and areas or territories and product lines as on particular dates; e) statement of payables arranged by creditors and age as on particular dates; f) statement of other assets as on particular dates (e.g., fixed and long-term assets, like land and building, plant and machinery, furniture and fixture, etc., current assets other than receivables like inventories, cash in hand and at bank, etc.); g) statement of liabilities other than payables, e.g., owners' equity, etc.; h) cash flow and funds flow positions over time; i) short-run and secular trends in revenues, expenses, profits, etc.; and j) comparative performance of the firm on the above yardsticks over time and with respect to

such other data as is available for the industry. The financial information system should ideally comprise a feedback control loop for monitoring and control.

While the information system serves the internal needs of the firms, it also is capable of and should be made to serve the informational needs of other agencies needing the information, e.g., the government's taxation authorities, local and national planning agencies, etc.

The two key financial statements frequently made use of are: a) revenue statements revealing the results of the operations over a period of time, and b) balance sheets revealing assets and liabilities as on a particular date. In the following sections, some specimen financial statements of various kinds of private enterprises have been discussed.

Dry cleaning business

Records usually maintained: a) journal, b) ledger, and c) cash records.

Table 7. Profit and loss statement (percent)

Income	Current month		Year to date	
	\$	% of sales	\$	% of sales
Call and delivery (retail)	81.6		80.2	
Plant store (retail)	14.3		12.7	
Wholesale	4.1		7.1	
Total income	100.0		100.0	
Operating expenses				
Production expenses				
Direct labor	29.5		29.1	
Work done outside the plant	0.8		0.7	
Total production labor	30.3		29.8	

Table 7. (continued)

Income	Current month \$ % of sales	Year to date \$ % of sales
Production supplies		
Solvent	2.1	2.1
Soaps and chemicals	2.5	2.3
Packaging supplies	1.9	1.8
Finishing supplies	1.0	1.1
Total production supplies	7.5	7.3
Power plant expense		
Electricity and power	1.4	1.3
Gas	1.8	1.7
Water	0.3	0.3
Repairs and maintenance, power plant	0.6	0.6
Total power plant expense	4.1	3.9
Building overhead expenses		
Repairs and maintenance	1.0	0.9
Depreciation	1.0	1.0
Insurance	0.2	0.2
Taxes	0.4	0.3
Total building overhead expenses	2.6	2.4
Machinery overhead expenses		
Repairs and maintenance	2.4	2.4
Depreciation	2.8	2.8
Insurance	0.3	0.2
Taxes	0.3	0.3
Total machinery overhead expenses	5.8	5.7
Indirect overhead expenses		
Superintendence	3.9	3.8
Insurance (bailee, compensation, and public liability)	0.3	0.2
Miscellaneous expenses	1.4	1.4
Total indirect overhead expenses	5.6	5.4
Total production expenses	55.9	54.5
Sales and distribution expenses		
Delivery wages and commissions	8.4	7.7
Office salaries	3.5	3.5
Maintenance and repairs--delivery equipment	1.9	1.8
Depreciation--delivery equipment	1.9	1.9
Insurance--delivery equipment	0.3	0.3
Advertising	2.0	1.9
Express and parcel post	0.6	0.7
Claims adjustment	1.2	1.2
Total sales and distribution expenses	19.8	19.0

Table 7. (continued)

Income	Current month \$ % of sales	Year to date \$ % of sales
Office and administrative expenses		
Office supplies	0.3	0.3
Office salaries	4.6	4.3
Depreciation, furniture, fixtures	0.9	0.9
Postage	0.5	0.3
Telephone	0.6	0.5
Legal and auditing expenses	2.0	1.8
Executive salaries	6.5	6.4
Total office and administrative expenses	15.4	14.5
Total operating expenses	91.1	88.0
Net profit	8.9	12.0

The percent figures are based on details quoted in the Starting and Managing Series, Vol. 12, on Starting and Managing a Small Dry Cleaning Business, published by the Small Business Administration, Washington, D.C., 1966 [89]. The above statement serves to show that there may be month to month variations caused by seasonal factors, etc., but by and large the industry averages would tend to obtain. It is true, however, that economies or diseconomies of scale would tend to affect performance as well. The rough indicators match very well with figures suggested by the National Institute of Dry Cleaning (as quoted in the SBA booklet referred to above), viz.:

Total production labor and outside work	28.52% of sales
Total production supplies	8.50% to 9.50%
Total power plant expenses	4.30%
Total building overhead expenses	3.40% if rented or 2.33% if owned

Total machinery overhead expenses	4.27%
Total indirect overhead expenses	8.57%
	etc.

The typical balance sheet as on a particular date would show:

Table 8. Balance sheet as at...

Assets	\$	\$
Current assets		
Cash		
Accounts receivable		
Supplies		
Prepaid insurance		
Prepaid rent		
Total current assets		
Plant assets (fixed assets)		
Plant equipment		
Less accumulated depreciation		
Office equipment		
Less accumulated depreciation		
Delivery equipment		
Less accumulated depreciation		
Total plant assets		
Total assets		
Liabilities		
Current liabilities		
Accounts payable		
Wages payable		
Taxes payable		
Total current liabilities		
Long-term liabilities		
Notes payable		
Total liabilities		
Capital and surplus/deficit		
Total liabilities and capital		

based on the SBA booklet referred to earlier. Essentially, the Balance Sheet or statement of net worth can be broken down into: net financial assets + net physical assets = owners' equity.

Retail hardware store

A study of 970 retail hardware stores (containing a comparison of the one-third with the highest total earnings with the remaining two-thirds) quoted in Vol. 10: Starting and Managing Series (Starting and Managing a Small Retail Hardware Store) published by the Small Business Administration, Washington, D. C., 1965 [88] reveals the following set of figures.

Table 9. Accounting records showing operating results

	Profit makers	Remaining two-thirds
Number of stores	324	646
Percent of stores offering installment sales	41	38
Percent increase in sales over previous year	3.30	1.35
Statement of income	% of sales	% of sales
Sales	100.0	100.0
Cost of goods sold	67.45	68.70
Gross margin	32.55	31.30
Salaries paid		
To owners and managers	7.10	8.65
To salespeople, office staff and others	9.15	11.00
Other business costs	16.25	19.65
Office supplies and postage	0.45	0.45
Advertising	1.45	1.65
Donations	0.05	0.05
Telephone and telegraph	0.35	0.40
Losses on notes and accounts	0.15	0.20
Delivery expenses (other than wages)	0.50	0.70
Depreciation--delivery equipment	0.20	0.30
Depreciation--furniture, fixtures, tools	0.40	0.50
Rent	2.80	3.15
Repairs to building	0.05	0.05
Heat, light, water, power	0.90	1.00
Insurance (not including amounts paid in connection with real estate ownership)	0.80	1.00

Table 9. (continued)

	Profit makers	Remaining two-thirds
Taxes (not including Federal income tax)	1.25	1.45
Interest on borrowed money	0.00	0.00
Unclassified expenses (including store supplies)	1.00	1.25
Total other costs	10.35	12.35
Total expense (not including interest on investment)	26.60	32.00
Net profit	5.95	(0.70)
Cash discount and other earnings	1.40	1.45
Total earnings before federal income tax	7.35	0.75

The study under reference also compared the prosperous one-third to the less prosperous two-thirds of firms in terms of return on investment, active owner's percent of return on investment, salaries paid to owner/manager, to sales persons, to office employees, to other employees, sales per year per person employed, merchandise inventory held per \$10,000 of sales, average stock turnover ratios, average collection period for accounts receivable, capital turnover ratios, current asset ratios, total debt to tangible net worth ratios, quick asset ratios; working capital turnover ratios, etc.

(One would normally expect an efficient financial information system to make available the above kinds of information, but once again a small firm would usually prepare a profit and loss statement and a balance sheet and maintain journal, ledger, and cash records to aid its functioning and would normally make use of professional services for detailed analytical work.)

The Balance Sheet would contain descriptions of net financial assets and net physical assets representing net worth as on a particular date, in pretty much the same manner as that for other business concerns.

A small restaurant

Compared to the other types of business undertakings discussed here the restaurant business is somewhat different in some respects. "Statisticians tell us that the average American family is currently spending approximately 25 percent of its food dollar on food eaten outside the home and that this amounts to \$18.4 billion each year. The restaurant industry (or 'food-service industry' as it is called in the trade) is in fact, the fourth-ranked industry (in terms of retail sales) in the United States" (Starting and Managing a Small Restaurant, The Starting and Managing Series, Vol. 9, Small Business Administration, Washington, D. C., 1964) [87]. The accounting practices adopted by various restaurants may not be uniform and this may render comparison very difficult. Since this kind of business deals in a lot of perishables, a great deal of internal control is desirable in order to avoid/minimize inefficiency in operations.

The National Restaurant Association has adopted a uniform System of Accounts some time ago, and a sample profit and loss statement and sample balance sheet based on this system would appear as follows

(Starting and Managing a Small Restaurant, Vol. 9):

The chief advantages would be inter-firm comparability and facility for internal management.

Table 10. Profit and loss statement for the period ended...

	% of sales
Food sales	100.00
Cost of food consumed	41.88
Gross profit	58.12
Other income	0.70
<u>Total income</u>	58.82
<u>Controllable expenses</u>	
Payroll	29.65
Employee benefits (social security, health insurance, hospitalization, etc.)	1.42
Employees' meals (not figured)	
Direct operating expenses (uniforms, supplies, menus, licenses and other items)	4.83
Music and entertainment	0.06
Advertising and promotion	0.89
Utilities	2.29
Administrative and general	2.29
Repairs and maintenance	1.58
<u>Total controllable expenses</u>	43.01
Profit before rent	15.81
Rent or occupation costs	5.39
Profit before depreciation	10.42
Depreciation	2.44
Profit before income tax	7.98

The typical balance sheet resembles those for other business enterprises.

Table 11. Balance sheet as at...

Assets	
<u>Current assets</u>	
Cash on hand	
On deposit	
Total cash	
Accounts receivable	
Advances to employees	
Deposits with utility companies	
Inventories	
Food	
Supplies	
Total inventories	

Table 11. (continued)

Assets	
	Prepaid insurance, taxes, etc.
	Total current assets
Fixed costs	
	Furniture and fixtures
	Less accumulated depreciation
	Air conditioning
	Less accumulated depreciation
	Leasehold improvement
	Less accumulated depreciation
	Operating equipment (cutlery and crockery)
	Total assets
Liabilities and capital	
Current liabilities	
	Accounts payable
	Taxes collected
	Outstanding and accrued expenses--payroll, taxes, rent, interest, etc.
	Total current liabilities
	Equipment contracts payable
	Notes payable (long-term)
	Total liabilities
Capital	
	Owner's account
	Profits
	Less owner's drawings
	Net:
	Total liabilities and capital

Grocery store

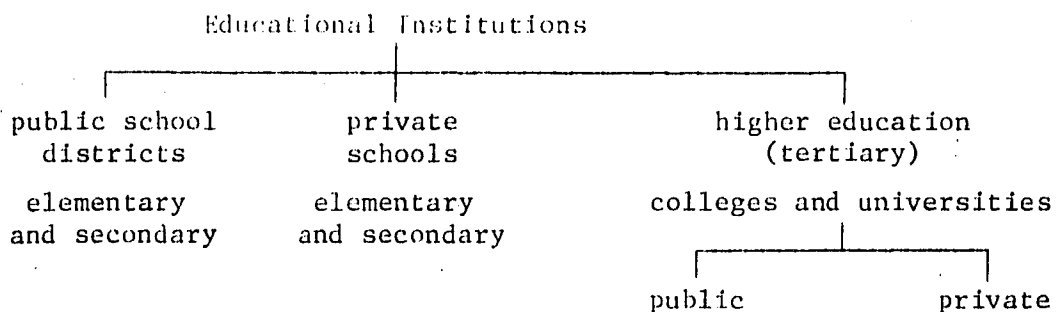
In the grocery business, as in every other form of business in the private enterprise sector, the magnitude and level of sophistication of internal accounting and managerial checks, controls and audit procedures and external audit depends on (a) whether the organization

is run on line authority or is of the staff type or of the line and staff type; (b) form of organization, viz., sole proprietorship, partnership or joint stock company; (c) volume of business transacted; (d) volume of investment; (e) nature of the cost structure, controllable vis-a-vis uncontrollable costs, avoidable vis-a-vis unavoidable costs; and (f) the nature of the business. The accounting records maintained are similar to those maintained by other private enterprises.

The above illustrations are intended to demonstrate the nature of the basic accounting records at the micro level which serve as the source of information for aggregations at higher levels.

Educational institutions

The procedure discussed here applies to all nonprofit institutions of education, whether publicly or privately controlled. In the publicly controlled institutions, the impact of legal regulation is more significant as it may affect both funding and management of the institution concerned.



Although public school districts basically follow governmental accounting methods, there are some basic differences. Similarly, there are certain differences between an institution of higher education and a municipality, for example: a) employees are selected on merit, rather than via a political process; b) continuity of administration; c) even where substantial governmental financing is involved, legal regulation and rigidities are not as spectacular in an educational institution as they are in a municipality; d) the above three factors contribute to greater flexibility in operations in educational institutions and allows them to be functionally more efficient; and e) the sources of finances are usually different and the emphasis in deployment of such funds is also different.

Fox [29, pp. 162-163] has demonstrated how the information available in educational institutions may be used for the purpose of modeling and educational planning. It is also conceivable that the total income approach could be extended to this nonmarket system. The following are the special features of governmental accounting:

- a) Recording of governmental receipts and accruals
(amounts due to be received but not yet received)
and payments and outstandings (amounts payable but
not yet paid).

b) Presentation of information for the purpose of evaluation of public welfare by the concerned politicians, administrators, and citizenry in general--serving the informational needs of the judiciary, when called upon to do so, the executive and legislative branches of the government.

Nonprofit institutions and associations would usually prepare Income and Expenditure Accounts for the period under review and Balance Sheets on the dates of review, and maintain the usual records including receipts and payments accounts or cash records.

Information on religious institutions and some philanthropic and voluntary associations may not, however, be processed in a manner similar to that in business enterprises. However, their records can nevertheless be linked to the nature of various behavior settings with some effort.

A financial report of a parish in the midwest is appended below and is intended to show that the degree of detail incorporated in the accounts may allow one to trace the behavior settings involved.

Table 12. Financial report, fiscal year 1977-78

EXPENDITURES

Salaries

Priests	\$ 10,500.00	
Minister to sick and aged	4,400.00	
Housekeeper	2,611.32	
Secretarial	3,711.47	
Musicians	1,646.61	
Custodial	6,807.15	
Social security	2,036.07	
Federal withholding tax	1,453.30	
State withholding tax	283.26	\$ 33,449.18

Operating expenses

Sanctuary	3,802.83	
Household	3,384.91	
Choir and music	81.00	
Custodial supplies	46.08	
Utilities	7,096.88	
Repair and maintenance	7,166.96	
Paper supplies	470.97	
Offering envelopes	1,469.22	
Other office supplies	3,280.33	
New equipment	2,821.35	
Assessments	5,661.00	
Garden expenses	20.00	
Advertising	137.52	
Principal on debt	25,000.00	
Interest on debt	8,223.41	
Witness subscriptions	789.00	
Archdiocesan collections	6,636.23	
School subsidy	77,572.22	
CCD subsidy	10,754.64	
Library subsidy	2,159.01	
Adult education		
Literature	858.60	
Fees--speakers	0.00	
Workshops	488.88	
Social action	14,654.18	
Pro-life	250.00	
Insurance	3,598.00	
Memorial Fund	1,168.62	
Refunds	350.00	
Miscellaneous	792.80	\$188,734.64
		<u>\$222,183.82</u>
TOTAL		

Table 12. (continued)

RECEIPTS

Ordinary receipts

Budget (Sunday envelopes)	\$164,873.52	
Offertory (not in envelopes)	20,004.70	
Students' offerings	<u>682.97</u>	\$185,561.19

Extraordinary receipts

Votive lights	134.00	
Stole fees (baptisms, weddings, funerals)	811.00	
Bingo utilities	1,280.00	
Debt retirement envelopes	6,289.05	
Bingo proceeds	3,000.00	
Donations	100.00	
Bulletin sponsors	120.00	
Garden receipts	801.00	
Memorials	2,248.12	
Special Collections (including Christmas and Easter)	29,774.54	
Witness subscriptions	792.00	
Refunds (insurance, office and sanctuary expense)	848.70	
Hot lunch loan repayment	500.00	
Sale of candles	13.00	
Cy-Ride (for the elderly)	54.00	
Savings account interest	<u>1,024.75</u>	<u>\$ 47,790.16</u>

TOTAL

\$233,351.35

Checkbook and savings balance 7/1/77	\$ 9,830.90
+ receipts July 1, 1977-June 30, 1978	<u>233,351.35</u>
Subtotal	\$243,182.25
- expenditures July 1, 1977-June 30, 1978	<u>222,183.82</u>
Checkbook and savings balance June 30, 1978	<u>\$ 20,998.43</u>

Balance remaining on church debt: \$137,000

Another example of the budgeting in institutions of this kind is furnished below:

Table 13. University Commission Budget, 1977-78 (statements of objective are in process and will be submitted to the Council when the University Commission makes its annual report to the Council on Monday, April 11, 1977).

<u>Newman Budget</u>		
1. Thursday night Liturgy and get together	\$ 10.00/week	\$ 340.00
2. Retreats, parties, camp-outs service projects--6 per qtr.		500.00
3. Advertising & public relations	80.00/month	640.00
4. Antioch ^a	200.00/twice annually	400.00
5. Peer Ministry (2nd team)	50.00/month	400.00
6. Improvements and repairs		200.00
7. New programs and ideas	50.00/month	400.00
8. Cash flow		<u>300.00</u>
	TOTAL	\$3180.00
<u>University Budget</u>		
1. Librarian	\$ 2.75/hour	\$1200.00
2. Advertising		300.00
3. Campus Ministry		75.00
4. Speakers		2000.00
5. Library books		1000.00
6. Periodicals		900.00
7. Foreign student activities	50.00/event	200.00
8. New programs and ideas	50.00/month	<u>400.00</u>
	TOTAL	\$6075.00
Newman and University Commission Budgets: \$9,255.00		

^aStudents pay \$12.50 in addition to this amount.

Possibility of disclosure and principles of secularity may interfere with obtaining information in some cases.

With this brief account of the source records, let us now proceed to demonstrate the additional information content of the total income accounts being proposed by us.

Some results from Barker's year-long survey of nonhousehold behavior settings in Midwest town, 1963-64

Column (1) of Table 14 shows the amounts of time spent by the 830 residents of Midwest town in behavior settings controlled by the five different "authority systems" into which Barker clusters the 884 non-household behavior settings which occurred in the town during 1963-64. More than 500,000 hours were spent in settings controlled by private enterprises, over 300,000 in settings controlled by schools, nearly 200,000 in settings controlled by government agencies (Midwest is a county seat), 33,000 hours in church-controlled settings, and 63,000 in settings controlled by voluntary associations. The total of 1,125,134 hours amounted to more than 15 percent of the total living time, or nearly one-fourth of the waking time of the town's residents.

Columns (2) and (4) show that nonresidents, nearly all from the trade area, school district, and church membership districts immediately surrounding the town, spent slightly more time in the town's church and school settings, and only slightly less time in its voluntary association settings, than did residents of the town itself. Probably more than half of the time spent by town residents in private enterprise settings was supplied by proprietors and employees (most of whom lived in town); nonresidents accounted for at least 40 percent of the hours spent by customers. Town and trade area seem to constitute a single tightly-knit community of about 1500 people; of our estimated 670 open country residents, county-level data suggest that about 370 are in farm operator households and the rest are wholly supported by nonfarm jobs.

Table 14. Time spent in specified categories of nonhousehold behavior settings in Midwest town by town residents and nonresidents, September 1, 1963-August 31, 1964^a

Category of nonhousehold behavior settings in Midwest town	(1)	(2)	(3)	(4)
	Occupancy time by:			
	Residents of Midwest town (hours)	Nonresidents ^b (hours)	Total, residents and non-residents (hours)	Nonresidents as percent of total (percent)
<u>All categories^c</u>	<u>1,125,134</u>	<u>755,596</u>	<u>1,880,730</u>	<u>40.18</u>
Churches	33,173	36,580	69,753	52.44
Schools	310,516	339,608	650,124	52.24
Private enterprises	531,555	202,628	734,183	27.60
Government agencies	186,896	121,179	308,075	39.33
Voluntary associations	62,994	55,601	118,595	46.88

^aCompiled and computed from selected tables of Barker and Schoggen [5, pp. 328-340].

^bNearly all of the "nonresidents" live on farms or in open-country nonfarm dwellings within five miles of Midwest town.

^cBarker refers to these categories as "authority systems," meaning the types of institutions which control the programs of the behavior settings in the respective categories.

Barker collected his data at the level of 884 behavior settings but reported it at the level of 198 behavior setting "genotypes," using a genus and species analogy. Thus, Genotype 83, Grocery Stores, contains three individual stores and Genotype 58, Elementary School Basic Classes, contains 13 individual classes; Genotype 15, Banks, contains a single setting.

Table 15 presents some of Barker's 1963-64 data for 20 of the 198 genotypes. The figures for Genotype 15, Banks, indicate that there was only one bank (N=1); it was open ("occurred") on 305 different days (O=305) for a total duration of 1,750 hours (D=1,750). Person-hours of occupancy time totaled 36,860 (Total OT), of which 26,499 were accounted for by town residents (Town OT) and 13,361 by nonresidents. The ratio of Total OT to duration indicates that an average of $36,860/1,750 = 21.06$ persons would be found in the bank at any given moment. Seven or eight of these would be officers or employees of the bank (zones 6 and 4) whose occupancy time is classified as gainful employment and whose earnings are included in the national income; the other 13 or 14 persons are customers (zone 3) and their activities are not recorded in official data systems.

Genotype 18, Basketball Games, accounts for nearly as many person-hours of behavior as does the bank, but their total duration is only one-sixth as great and the average number of persons present at a given moment is $36,058/272 = 133.6$. Apart from coaches and officials, the performers are amateurs, and the activities have little impact on the national income. Only 39 percent of total occupancy time is accounted for by town residents; however, many of the "nonresidents" are farm and open-country residents of the Midwest school district, and the remainder are associated with the visiting teams.

Genotype 58, Elementary School Basic Classes, accounts for 222,119 hours of occupancy time. On the average, there are $222,119/8,945 = 24.83$

Table 15. Examples of behavior setting genotypes in the town of Midwest, Kansas, 1963-64^a

Genotype name and identification number ^b	Behavior setting resource measures			Output measure: person-hours of occupancy time (OT) by:	
	Number of settings	Occurrences: Setting-Days	Duration: Setting-Hours	Town residents town OT	All persons total OT
	N	O	D		
9 Attorneys offices	4	1,155	7,250	20,584	23,347
15 Banks	1	305	1,750	26,499	36,860
18 Basketball games	14	124	272	14,164	36,058
34 Cleaners, dry cleaning plants	1	305	2,500	6,559	6,770
54 Drugstores	1	307	3,339	30,371	39,212
58 Elementary school basic classes	13	2,250	8,945	98,251	222,119
81 Government offices: business, records	9	1,997	15,124	27,386	75,140
83 Grocery stores	3	654	7,118	66,396	83,187
85 Hardware stores	2	610	5,060	10,106	12,181
117 Meetings, business	103	684	1,544	5,054	15,562
157 Religion classes	42	1,707	1,573	7,657	14,329
161 Religious workshop services	24	535	440	12,648	26,435
162 Restaurants and dinners for the public	15	1,352	12,821	91,037	118,860
177 Service stations	4	1,408	15,780	28,408	39,281
191 Street fairs	2	4	24	3,589	12,048
194 Taverns	1	308	4,450	13,099	18,288
203 Trafficways	1	366	8,784	87,376	95,827
208 Variety stores	1	305	3,060	15,549	21,330
217 Welfare offices	1	250	2,040	7,315	21,330
219 Woodworking and machine shop classes	1	180	495	2,285	4,606

^aSource: Barker [2, Table 5, pp. 110-116].

^bBarker found 198 genotypes in his 1963-64 survey but his identification numbers, running from 1 to 220, include 22 genotypes which existed in 1954-55 but not in 1963-64.

persons in each session of each class, one teacher and 22 or 23 students. The teacher's activities are included in national employment and income statistics; the students' are not. Only 44 percent of total occupancy time is accounted for by town residents; the "nonresidents" are obviously residents of the school district, with the possible exception of one or two teachers who might commute from farther away.

Between them, Genotypes 157 and 161, Religion Classes and Religious Worship Services, account for 40,764 hours of occupancy time, divided equally between town residents and others. A very small percentage of the occupancy time is accounted for by paid ministers; the other leaders and functionaries are volunteers operating outside of the national employment statistics and income accounts.

Thus, if we take person-hours of occupancy time as a rough measure of social system outputs, we find that none of Barker's genotypes are wholly within the economy (since customers' time is not counted as an economic activity) and some of them are almost wholly outside of it.

Table 16 shows striking differences in the use of the town's behavior settings by members of different age groups and different socioeconomic classes. Barker's classes 1, 2 and 3 correspond to Warner's [110] upper middle, lower middle, and upper lower; under conditions of social participation in Midwest in the 1950's and early 1960's, Barker felt that the town's 26 blacks formed a caste rather than a class. The figures in column (2) suggest a very substantial income elasticity of demand for total occupancy time in community behavior settings; many factors are involved but we will not detail them here.

Table 16. Hours per person spent in community behavior settings, number of prominent action patterns "consumed" per hour, and number of prominent attribute-hours "consumed" during 1963-64 by various subgroups of the residents of Midwest town, September 1, 1963-August 31, 1964^a

Population subgroup	(1) Number of persons	(2) Hours per person spent in community (nonhousehold) behavior settings, 1963-64	(3) Number of prominent action patterns per hour of occupancy time	(4) Number of prominent attribute-hours consumed during 1963-64
<u>A. By social class or caste</u>				
All groups combined	830	1356	2.438	3306
Social class 1	73	2107	2.596	5470
Social class 2	438	1406	2.406	3383
Social class 3	293	1154	2.428	2802
Blacks	26	667	2.379	1587
<u>B. By sex</u>				
Both sexes	830	1356	2.438	3306
Males	415	1453	2.447	3555
Females	415	1258	2.430	3057
<u>C. By age group</u>				
Infants (ages 0-1)	13	415	2.078	862
Preschool (2-5)	53	397	2.015	800
Younger school (6-8)	46	1611	2.685	4326
Older school (9-11)	47	1924	2.678	5152
Adolescents (12-17)	84	2255	2.504	5647
Adults (19-64)	411	1610 ^b	2.415 ^b	3888 ^b
Aged (65 and over)	176	471	2.101	990

^aSources: Column (1) comes directly from Barker and Schoggen [5, Table 11.1, p. 368]; Columns (2), (3), and (4) were derived by Fox from data in several different tables in Barker and Schoggen.

^bEvidently reflects substantial amounts of out-commuting (gross, as time spent in Midwest town by nonresidents is not included in this tabulation). Apart from that, there must be very large differences between the average amounts of time spent in nonhousehold behavior settings by women who are gainfully employed and those who are not. Nearly all of the Midwest males aged 18-64 were gainfully employed in 1963-64.

We use Table 16 to give some empirical reference to the models we will present in our remaining sections.

Total income is the product of waking hours and average hourly earnings or "behavioral capacity"; some illustrative figures are as follows: The logic behind these computations has been shown in Chapter V.

Table 17. Computation of total income

Years of schooling	Age	Waking hours	Average hourly earnings or "behavioral capacity"	Total income
-6	0	2928	\$ 0.453	\$ 1,326
-4	2	4392	0.566	2,486
-2	4	4758	0.708	3,369
0	6	5124	0.884	4,530
2	8	5124	1.105	5,662
4	10	5490	1.380	7,576
6	12	5490	1.724	9,465
8	14	5490	2.154	11,825
10	16	5490	2.690	14,768
12	18	5856	3.361	19,682
<u>12</u>	30	5856	3.715	21,755
	40	5856	4.038	23,647
	50	5856	4.389	25,702
<u>14</u>	30	5856	4.564	26,727
	40	5856	4.961	29,052
	50	5856	5.392	31,576
<u>16</u>	30	5856	5.607	32,835
	40	5856	6.095	35,692
	50	5856	6.625	38,796
<u>18</u>	30	5856	6.889	40,342
	40	5856	7.488	43,850
	50	5856	8.139	47,662
<u>20</u>	30	5856	8.464	49,565
	40	5856	9.200	53,875
	50	5856	10.000	58,560
	60	5490	10.869	59,670
	70	5124	11.814	60,535
	80	4392	11.814	51,887

According to the above figures, total income for males reaches its peak, or rather a high plateau, at about \$60,000 a year for "average males with 20 years of schooling."

The SRC averages for "Normal Work plus Second Job" (Column 1), "Other Work-Related Activities" (Column 2), "Night Sleep plus Naps, Resting" (Column 6), "Other Personal Care" (Column 7), and "Passive Leisure" (Column 12) show smoother progressions from one adult age group to another than do the corresponding figures in Table 18; the SRC averages for 1176 adults (567 males and 609 females) are:

Age group	(1) Normal work plus second job	(2) Other work- related	(6) Night sleep and naps, resting	(7) Other personal care	(12) Passive leisure
Males:					
18-24	1870	337	2955	860	971
25-34	2118	367	2867	883	992
35-54	2073	348	2988	996	1036
55-64	1341	270	3110	1124	1324
65 and over	238	36	3430	1287	1866
Females:					
18-24	1240	259	3083	899	1014
25-34	1078	193	3013	902	960
35-54	1058	177	2954	974	1036
55-64	621	123	3226	1017	1282
65 and over	216	24	3407	1272	1461

Given the differences in time (1963-64 versus 1975-76) and place (Midwest, Kansas versus averages for the United States), the age profiles of time spent in work-related activities need not have followed the SRC pattern in Midwest and its trade area. For example, the SRC sample picked up very few farmers or farm workers; in contrast, 114 out

Table 18. Preliminary time allocations among major categories of activities, or behavior settings, for population sub-groups in a community of 1500 people

		(1)	(2)	(3)	(4)	(5)
Age groups	Waking hours	Total job OT (FB)	Other work-related	House-work	Child care	Shop-ping
0	2928	0	0	0	700	0
1	3660	0	0	0	900	0
2	4392	0	0	0	800	0
3	4392	0	0	0	800	0
4	4758	0	0	0	800	0
5	4758	0	0	0	300	0
6	5124	0	0	0	200	0
7	5124	0	0	0	200	0
8	5124	0	0	0	200	0
9	5124	0	0	0	200	0
10	5490	30	5	0	200	0
11	5490	36	6	0	200	0
12	5490	62	11	0	0	0
13	5490	25	4	0	0	0
14	5490	59	11	0	0	0
15	5490	160	29	0	0	0
16	5490	145	26	0	0	0
17	5490	217	39	0	0	0
<u>Males:</u>						
18-24	5856	1574	283	243	33	197
25-34	5856	2005	361	349	93	208
35-54	5856	2113	380	383	92	177
55-64	5490	1827	329	625	15	200
65 and over	4758	55	10	705	42	284
<u>Females:</u>						
18-24	5856	695	125	740	176	279
25-34	5856	480	86	1052	382	337
35-54	5856	989	178	1162	205	375
55-64	5490	1005	181	1233	87	361
65 and over	4758	33	6	1019	31	377
<u>Both sexes:</u>						
Nursing home	2928	0	0	0	0	0

(6) Night sleep & naps/ resting	(7) Other personal care	(8) Educa- tion	(9) Organi- zations	(10) Recrea- tion	(11) Active leisure	(12) Passive leisure	(13) Total hours
5856	400	0	0	100	1000	728	8784
5127	400	0	0	100	1200	1060	8784
4392	400	0	50	200	1500	1442	8784
4392	400	0	50	200	1500	1442	8784
4026	400	0	50	200	1800	1508	8784
4026	400	500	50	200	1800	1508	8784
3660	500	1080	50	300	1500	1494	8784
3660	500	1080	50	300	1500	1494	8784
3660	500	1080	50	300	1500	1494	8784
3660	500	1080	100	300	1500	1444	8784
3294	500	1080	100	300	1500	1783	8784
3294	500	1080	100	300	1500	1779	8784
3294	600	1440	100	400	1464	1413	8784
3294	600	1440	100	400	1486	1435	8784
3294	600	1440	100	400	1465	1415	8784
3294	600	1440	100	400	1406	1355	8784
3294	600	1440	100	400	1415	1364	8784
3294	600	1440	100	400	1372	1322	8784
2928	885	293	88	563	382	1315	8784
2928	823	124	99	402	286	1106	8784
2928	1056	35	136	300	223	961	8784
3294	940	31	138	308	300	777	8784
4026	692	12	184	359	309	2106	8784
2928	1055	83	118	625	269	1691	8784
2928	988	56	124	486	205	1660	8784
2928	999	28	196	378	247	1099	8784
3294	948	18	205	307	310	835	8784
4026	653	9	260	338	354	1678	8784
5856	600	0	150	300	200	1678	8784

of 494 households in the FB data set (23 percent) lived on farms, where traditionally elderly people kept on working to advanced ages and children began helping at rather early ages. Also, most of the businessmen in Midwest were self-employed and not inclined (or financially able) to retire early.

In addition, our pattern of job assignments and assumed hours of work per year no doubt differs from the pattern that actually existed in Midwest and its trade area, despite our efforts to observe the many constraints implicit in Barker's published data. We do not think these differences are important in the present context of preliminary calculations.

The positive achievement of Table 18 is that it links an internally consistent household sector for U. S. adults with a major component of the nonhousehold sector, so intensively studied by Barker--specifically, the entire micro-data set of jobs. In subsequent work with the FB data set, it will be desirable to use the SRC information (perhaps with some rounding) for "Night Sleep and Naps, Resting" and "Other Personal Care," and to handle the interactions between "Total Job OT," "Other Work-Related Activities," and "Passive Leisure" in such a way as to yield smoother progressions from age group to age group than are now shown in Columns 1, 2, and 12 of Table 18.

A number of points should be noted:

- 1) The total income calculations in Tables 20 and 21 assume that average money earnings per hour on the job are equal to average total income per hour over all waking hours.

2) The census figures underlying our regression equation are earnings, and do not include income from property and transfer payments. Total earnings from current behavior, or "total behavioral income," might be appropriate names for the concept embodied in our present calculations.

3) We are assuming that most people use their behavioral resources during working hours at the same average rate they maintain during their waking hours as a whole.

4) We also assume that people generally produce as much "behavioral income" on the job as they are paid for.

For females 18 years and over, at least for the present, we propose to use the ratio of average hourly earnings of females to males in the Census data on 1969 earnings, as has been explained in Chapter V.

Sources of Data Used for Allocating Time Exhaustively
Among Twelve Purpose-Oriented Categories of
Activities or Behavior Settings

The time-use estimates employed in our subsequent calculations are displayed in Table 18.

The figures for adults in Columns 3, 4, 5, 8, 9, 10, 11 and 12 are means for the specified age groups and sexes among 1176 adults in the SRC study of American's Use of Time in 1975-76. The figures in Column 6 are round numbers specified by us, and the figures in Column 7 were obtained by subtracting Column 6 from the SRC averages for time spent in "Personal Care." The figures in Column 1 are averages of Job OT

(hours of "occupancy time" spent in gainful employment) by individuals in the Fox-Barker data set. Column 2 equals 0.18 times Column 1, a ratio based on detailed SRC activities within the "Work-Related" group. Column 2 is an allowance for lunch and coffee breaks at work and commuting time. To the extent that the sum of Columns 1 and 2 differs from the corresponding SRC average for work-related activities, an offsetting departure is made from the SRC average for "Passive Leisure" in Column 12. The twelve columns should sum to 8784 hours.

The figures in Table 18 for children aged 0-17 are based on our own a priori estimates of sleeping and waking hours and a rough allocation of Barker's 1963-64 data on time spent in school and church "authority systems" by children of different ages to the corresponding SRC columns.

Allocating Equivalent Dollar Values of Behavioral Capacities
and Rewards Exhaustively among Twelve Purpose-Oriented
Categories of Activities or Behavior Settings

To keep the calculations simple and reproducible at this preliminary stage, we have done two things:

1) We have separated the twelve time-use categories into five in which extrinsic rewards arise and seven in which intrinsic and concomitant rewards arise.

2) We have assumed that the equivalent dollar value per hour of behavioral resources used in the five time-use categories producing extrinsic rewards is the same as in the seven time-use categories in which intrinsic and concomitant rewards are consumed.

Allocating equivalent dollar values of behavioral capacities among the twelve time-use categories

We now have the problem of allocating the total dollar values of z_{cog} , z_{aff} , z_{psm} , and z_{gm} separately and exhaustively among the twelve time-use categories in Table 18.

1) First, we enter values of zero for each of the four z 's in Column 6 (night sleep plus naps and resting).

2) For z_{gm} (capacity for gross motor activity), we are using for the present a point system shown in Column (1) below for heaviness of "work." The male adult represented in the calculations is assumed to have a total income of more than \$20,000, of which \$4,000 is attributed to z_{gm} . He is 18-24 years old, a member of Barker's Socioeconomic Class 1 (upper middle), and works 2000 hours a year; this implies 360 hours of other work-related activities, or 2,360 hours of work-related activities in all. This is 154 hours larger than the SRC average of 2206 for such activities on the part of 18-24 year old males; to offset this, we subtract 154 from the SRC average of 970 hours of passive leisure for 18-24 year old males and another 4 hours to offset rounding errors and reduce the sum of the twelve time uses from 8788 to 8784 hours.

The points per hour are rough judgment estimates reflecting (1) our recollections of Durnin and Passmore's [23] characterization of, and calorie consumption estimates for, a wide range of occupations, recreations, and household tasks and (2) our recollections of the DOT (Dictionary of Occupational Titles) characterizations of specified occupations as sedentary, light, medium, heavy, and very heavy.

Column numbers in Table 18	(1) Heaviness of "work": points per hour	(2) Hours per year spent in the activities	(3) Points per year spent (1) x (2)	(4) Dollars of z_{gm} allocated to the activities
2,4	3	393	1179	328
3,5	4	440	1760	489
12	1	812	812	226
11	4	382	1528	425
10	3	563	1689	470
9,8	2	381	762	212
7	3	885	2655	738
<u>1 (Job OT):</u>				
SE Class 1	2	2000	4000	1112
SE Class 2	3	--	--	--
SE Class 3	4	--	--	--
6	0	2928	0	0
Total	1.6376	8784	14,385	\$4,000

In the example shown, the individual's activities require 14,385 points a year with a total value of \$4,000. If we multiply the points in Column (3) by $\$4,000/14,385$, we obtain the estimates of dollar values of z_{gm} allocated to the various categories of activities or behavior settings in Column (4).

In Table 19 below, we list our tentative estimates of points per hour for each of the four behavioral capacities. It should be noted that the point ratings are internal to each behavioral capacity or mechanism separately and should not be compared between two or more behavior mechanisms. They are to be used for internal prorations as shown in the example given for z_{gm} .

Table 19. Tentative estimates of points per hour for behavioral capacities

<u>Column number in table 18</u>	<u>z_{gm}</u>	<u>z_{psm}</u>	<u>z_{aff}</u>	<u>z_{cog}</u>
2	3	2	2	2
4	3	2	4	3
3	4	2	1	2
5	4	2	1	4
12	1	1	2	2
11	4	3	4	3
10	3	2	4	3
9	2	2	3	3
8	2	2	2	6
7	3	2	3	3
<u>1 (Job OT):</u>				
SE Class 1	2	2	2	8
SE Class 2	3	3	2	6
SE Class 3	4	4	2	4
6	0	0	0	0

Allocating equivalent dollar values of rewards among the twelve time-use categories

We will use q_{ex} , q_{in} , and q_{con} to denote equivalent dollar values of the three categories of rewards, extrinsic, intrinsic, and concomitant respectively. Our next problem is to assign dollar values to q_{ex} , q_{in} and q_{con} (a) as totals, and (b) also for each of the twelve major time-use categories.

Just as total income for an individual was allocated among the four behavior mechanisms, so it must also be allocated exactly among the three types of rewards. To accomplish this, we make several assumptions:

1) We assume that q_{in} and q_{con} must be consumed in the same behavior setting in which they are produced; they cannot be transferred to other settings (read also "from one column to another column").

2) Extrinsic rewards, q_{ex} , by definition are not consumed in the behavior setting (or column) in which they are produced. We will assume that for persons 18 years and over, q_{ex} is produced in Cols. 1, 3, 5, 8, and 4. Some q_{in} and q_{con} may also be produced, and simultaneously consumed, in these columns.

The simplest case would involve a "primary adult"--i.e., a single-person family. Suppose his q_{ex} from Cols. 1, 3, and 5 (plus Cols. 8 and 4 if they are nonzero) totals \$20,000 and that none of this is taxed, given away, saved for future years, or converted into human capital in his own person. Then, his \$20,000 of q_{ex} is carried into Cols. 2, 6, 7, 9, 10, 11 and 12 and allocated exhaustively among them; in those columns, q_{ex} is transformed into q_{in} and q_{con} .

For the present calculations, we will assume that q_{ex} per hour produced in Cols. 1, 4 and 8 is valued at average hourly earnings, and that q_{ex} produced in Cols. 3 and 5 is valued at \$3.00 an hour, assumed to be the cost of hiring the housework (including yard work) and shopping done by a housekeeper and a (part-time) yard man or man-of-all-work as of 1969.

3) If all q_{ex} produced in the current year is consumed in the current year, then $\Sigma q_{ex} = 0$, and Total Income = $\Sigma q_{in} + \Sigma q_{con}$. However, if part of q_{ex} is invested (as human capital, say), then $\Sigma q_{ex} > 0$, and $(\Sigma q_{in} + \Sigma q_{con}) = \text{Total Income} - \Sigma q_{ex}$.

For the present calculations, we assume that:

$$\Sigma q_{in} = 0.7 (\text{Total Income} - \Sigma q_{ex});$$

$$\Sigma q_{con} = 0.3 (\text{Total Income} - \Sigma q_{ex}).$$

Also, we will limit Σq_{ex} only to zero and positive values; if Σq_{ex} (summed algebraically across all 12 columns) is greater than zero, we will interpret it as human capital formation.

4) Now consider a husband-and-wife family with no children or other adults in it; assume that the husband spends 2000 hours in his job and has expected earnings of \$8.00 per hour. Assume further that he does no housework, no shopping, and that his total q_{ex} produced equals \$16,000. Assume that the wife does not have a job but spends 1500 hours on housework and shopping, at an imputed q_{ex} of \$3.00 an hour; then her q_{ex} produced equals \$4,500.

If the husband has 5500 waking hours, his total income = \$8.00 (5,500) = \$44,000. If the wife has the same number of years of

schooling and is the same age, we compute her average hourly earnings at $0.72 (\$8.00) = \5.76 , and her total income at $\$5.76 (5,500) = \$31,680$.

If the husband contributes his \$16,000 of q_{ex} to a household "pool" and the wife contributes her \$4,500 of q_{ex} to the same pool, their remaining incomes apart from the pool are: husband, \$28,000 and wife, \$27,180. If drawing rights on the pool are 60 percent for the husband and 40 percent for the wife, the husband draws \$12,300 from the pool and consumes $\Sigma q_{in} + \Sigma q_{con} = \$40,300$; the wife draws \$8,200 from the pool and consumes $\Sigma q_{in} + \Sigma q_{con} = \$35,380$. On these assumptions, the husband makes a net transfer of $\$16,000 - \$12,300 = \$3,700$ to the wife, who put \$4,500 into the pool and withdrew \$8,200; $\$4,500 - \$8,200 = -\$3,700$.

5) Now add to this family a 10 year old son, with an estimated earning power of \$1.40 an hour times 5,500 waking hours = \$7,700 total income. Assume that the son makes no contributions to the household pool of q_{ex} , and that drawing rights on the pool go 50 percent to the husband, 35 percent to the wife, and 15 percent to the son, or \$10,250 (husband), \$7,175 (wife), and \$3,075 (son). Then the husband makes a net transfer of $\$16,000 - \$10,250 = \$5,750$, of which $\$7,175 - \$4,500 = \$2,675$ goes to the wife and \$3,075 to the son.

The husband consumes $\$28,000 + \$10,250 = \$38,250$; the wife consumes $\$27,180 + \$7,175 = \$34,355$; and the son produces \$7,700 and receives a transfer of \$3,075; these two items total \$10,775.

6) There are some problems in allocating the son's \$10,775 between current consumption ($\Sigma q_{in} + \Sigma q_{con}$) and investment in his own human

capital. To keep the calculations simple at this stage, we are inclined to do the following with respect to all persons aged 0-17:

a) Assume that the time a child spends in Col. 4 (child care: i.e., being actively cared for, talked with, read to, played with, helped on handicrafts, toys, schoolwork, etc. by parents or other adults) and in Col. 8 (education: i.e., basic academic subjects, study halls, homework, and regular classes in physical education, music, shop, home economics, and commercial subjects) produces no q_{in} and no q_{con} , but does produce q_{ex} at the full rate of average hourly earnings. The full amount of q_{ex} produced in Cols. 4 and 8 will be classified as "investment in human capital"; it will not be transferred into other time-use columns.

Then, subtract the value of q_{ex} just described from the child's total behavioral income produced: \$7,700 in the case of the 10 year old boy. His $q_{ex} = \$1.40$ (200 hours child care) + $\$1.40$ (1080 hours education) = $\$280 + \$1512 = \$1,792$; the amount of his produced income remaining for his own current consumption is $\$7700 - \$1792 = \$5908$. This will be allocated 70 percent to $\Sigma q_{in} = .70 (5908) = \4136 and 30 percent to $\Sigma q_{con} = .30 (5908) = \1772 . These amounts, totaling \$5908 for $\Sigma q_{in} + \Sigma q_{con}$, will be his total current consumption.

b) All transfer payments to children 0-17 from household pools will be credited to "investment in human capital"; in the case of the 10 year old boy of our example, this amount is \$3,075.

c) These two items, \$1792 and \$3075, add to \$4867 of "investment in human capital" out of total income produced by the boy and his parents.

However, the unrounded figures on earnings, with logarithmic interpolation of hourly earnings at age 11 of $\$1.542 = \sqrt{(1.380)(1.724)}$, yield a total income of \$7,576 at age 10 and a total income of \$1.524 (5490 waking hours) = \$8466 at age 11. The increment is $\$8466 - \$7576 = \$890$. The way we are using our regression equation to estimate annual earnings of all subsequent age groups seems to imply that this increment of total income, \$890, will persist year after year to an advanced age. The present value of an income stream of \$890 a year for 50 years at a discount rate of 8 percent would have a present value of $\$890 (12.233) = \$10,887$.

Our instructions in the previous paragraphs attribute \$1,792 of this to self-investment by the boy and \$3,075 to transfers from the parents, a total of \$4867. How should we explain the additional $\$10,887 - \$4,867 = \$6,020$ of investment in the boy's behavioral capacities? For the present we would label it simply as "investment through natural growth."

Allocating total consumption among time-uses

Now we must decide how to allocate total consumption, Σq_{in} plus Σq_{con} , across the 12 time-use columns of Table 18.

1) To simplify calculations, we assume that the columns which produce q_{ex} , namely Cols. 1, 3, 4, 5, and 8, produce no q_{in} or q_{con} . Hence, $\Sigma q_{in} + \Sigma q_{con}$ will be allocated exhaustively among Cols. 2, 6, 7, 9, 10, 11, and 12.

2) We assume that in each of these seven "consuming" columns, $q_{in} = 0.70 (q_{in} + q_{con})$ and $q_{con} = 0.30 (q_{in} + q_{con})$; also, of course, $\Sigma q_{in} = 0.70 (\Sigma q_{in} + \Sigma q_{con})$ and $\Sigma q_{con} = 0.30 (\Sigma q_{in} + \Sigma q_{con})$.

3) We have taken the hours specified for each of these seven consuming columns in Table 18 for males, aged 35-54, summed them ($\Sigma_7 = 6049$ hours), expressed them as proportions of total consuming time (e.g., $2928/6049 = .4840$ for Col. 6, Sleeping, Naps, and Resting, etc.). Also, we have taken the family expenditure weights used in reweighting the U. S. Consumer Price Index as of December, 1963; made judgment allocations for each of the five major expenditure groups (rounded by Karl Fox: Food, .22; housing, .33; apparel and upkeep, .11; transportation, .14; and health and recreation, .20) among the seven time-use columns, and summed allocations of the five expenditure proportions to each column of Table 18 as follows:

Column number	(1) Proportion of consuming hours	(2) Proportion of Family Expendi- ture	(3) (2) : (1)	(4) (3) rounded
6	.4840	.10	0.2066	0.2
7	.1746	.44	2.5200	2.5
	<u>.6586</u>	<u>.54</u>	<u>0.8199</u>	
9	.0225	.04	1.7778	1.8
10	.0496	.12	2.4194	2.4
11	.0369	.08	2.1680	2.2
12	.1714	.10	0.5834	0.6
	<u>.2804</u>	<u>.34</u>	<u>1.2126</u>	
2	<u>.0610</u>	<u>.12</u>	<u>1.9672</u>	<u>2.0</u>
Total	1.0000	1.00	1.0000	1.0

The rounded figures in Column (4) are proposed weights for representing relative rates of consumption expenditures per hour in each of the seven consuming columns.

The proportions of total consuming hours in each of the seven columns will vary from one age-and-sex population subgroup to another, so the sum of hours times weights for particular population subgroups may not equal the actual number of consuming hours (i.e., the "weighted-average weight" $\neq 1.0$ exactly). In this case, we simply convert hours times weight in the i th column to a proportion of $\frac{\text{hours}_i (\text{weight}_i)}{\sum_{i=1}^7 (\text{hours}_i (\text{weight}_i))}$.

These seven proportions will add to 1.00000 (we carry 5 decimal places to keep rounding errors from becoming a nuisance); we use these proportions to allocate Σq_{in} and Σq_{con} among the seven consuming columns.

Transfers of Extrinsic Rewards Among Members of a Household

To be sure we are handling the household pools and associated transfer payments between household members properly, we have to group our 1454 people (other than the 46 residents of a nursing home) into their 494 households, and specify drawing rights appropriately for each type and size of household.

a) One-person households. There is no pool and no transfer problem.

b) Husband-and-wife households, with or without children 0-17 but not containing any of their children 18 and over and not containing an aged parent or other adult relative.

- 1) All q_{ex} produced by husband and wife in Cols. 1, 3, 4, 5 and 8 is put into the household pool; no child contributes to the household pool.
- 2) On the following pages, we have used BLS's "Revised Equivalence Scale" to arrive at a set of "drawing rights against household pool" for each member of the household, for each of several household sizes and compositions. Since there is no pool for one-person households, the drawing rights listed should cover a large proportion of the households in the Fox-Barker (FB) data set.
- 3) We must modify our comment about children 0-17 not contributing to the pool in the case where the child has some Job OT in Col. 1. If so, we assume that, like an adult, he produces no q_{in} or q_{con} in Col. 1, but he does produce q_{ex} in Col. 1 at the rate of his average hourly earnings and that he places all q_{ex} produced in Column 1 into the household pool. For the present, we will assume that the same drawing rights apply whether the child has Job OT or not.

The approximate allocations of consumption expenditures among household members (head aged 35-54) are:¹

¹These calculations are based on the revised equivalence scales for urban families of different size, age, and composition presented in Table 148, page 359 of U. S. Department of Labor, Handbook of Labor Statistics 1974 [109]. The scales assume "that families spending the same proportions of income on food have attained equivalent levels of living" (p. 15). We have chosen to use families with heads aged 35-54 for our calculations, as the basic family of 4 persons (husband, wife and two children, the older aged 6-15), with an equivalence of 100, also

	(1) Apparent share of consumption expenditures	(2) Drawing rights against "house- hold pool"
<u>Husband and wife, no children:</u>		
Husband: \$3240/\$5412 =	0.5987	.60
Wife: \$2172/\$5412 =	0.4013	.40
	<u>1.0000</u>	<u>1.00</u>
<u>Husband and wife, one child under 6 years:</u>		
Husband: 3240/6221 =	0.5208	.52
Wife: 2172/6221 =	0.3491	.35
Child under 6: 809/6221 =	0.1300	.13
	<u>0.9999</u>	<u>1.00</u>
<u>Husband, wife, two children under 6 years:</u>		
Husband: 3240/7211 =	0.4493	.45
Wife: 2172/7211 =	0.3012	.30
Younger child: 809/7211 =	0.1373	.14
Older child: 990/7211 =	0.1122	.11
	<u>1.0000</u>	<u>1.00</u>
<u>Husband and wife, one child, 6-15:</u>		
Husband: 3240/7390 =	0.4384	.44
Wife: 2172/7390 =	0.2939	.29
Child: 1978/7390 =	0.2677	.27
	<u>1.0000</u>	<u>1.00</u>
<u>Husband and wife, two children older 6-15:</u>		
Husband: 3240/9013 =	0.3595	.36
Wife: 2172/9013 =	0.2410	.24
Older child: 1978/9013 =	0.2195	.22
Younger child: 1623/9013 =	0.1801	.18
	<u>1.0001</u>	<u>1.00</u>
<u>Husband and wife, three children oldest 6-15:</u>		
Husband: 3240/10,460 =	0.3098	.31
Wife: 2172/10,460 =	0.2076	.21
Oldest child: 1978/10,460 =	0.1891	.19
Second: 1623/10,460 =	0.1552	.15
Third: 1447/10,460 =	0.1382	.14
	<u>0.9999</u>	<u>1.00</u>

has a head in that age bracket. The equivalence scale for a husband and wife with no children (head aged 35-54) is 60, and that for a single person is 36. As of August, 1972 (see Table 147, page 358, in the same Handbook) the annual consumption budget for the basic 4-person family at an intermediate level of living for the urban United States population as a whole was \$9,013. The equivalent dollar budget for the single person would be \$9013 (.36) = \$3244.68, and that for the two-person

c) One-parent households, children 0-17; no child 18 or older, and no additional relative or parent.

On the following page, we have listed "drawing rights" for such families with one, two, three, and four children respectively--the BLS scales do not vary according to ages of children in one-parent families.

d) Households with aged parents or other adult relatives, in addition to the husband and wife or to the male or female head widowed or divorced (but none of the head's own children aged 18 or over).

1) Choose the household type of the "nuclear family," excluding the adult relative or relatives; the drawing rights of the members of the nuclear family total 1.00.

2) If there is, in addition, one aged parent or other adult relative, add .22 to the present drawing rights of 1.00, and scale down each of the drawing rights by $1.00/1.22 = 0.820$; thus, the additional adult will draw 0.18 from the pool, and the nuclear family will draw 0.82, prorated among its members in the same ratios as before.

3) If there are two extra relatives, add .22 for each relative, raising total drawing rights to 1.44; then scale down by $1.00/1.44 = 0.694$; each extra relative will draw 0.22 (0.6944) = 0.153, or 0.306 for the two, and the nuclear family will share

family would be $\$9013 (.60) = \5407.80 . For several family compositions, we used the dollar figures in Table 147 directly, rather than using the equivalence scales, as the latter (in Table 148), had been rounded to only two significant figures. For example, the total family expenditure figures of \$7390; \$9013; and \$10,460 for the last three families on page 158 come directly from Table 147.

0.694 of the drawing rights in the same ratios as before.

e) Households with adult children aged 18 to 24.

1) Choose the household composition which would exist if the 18-24 year olds were excluded, with drawing rights totaling 1.00. Then, for each adult child, add 0.22 to total drawing rights and scale down as described for aged parents and other adult relatives.

2) If any adult child or adult relative has Job OT, I assume that half of his q_{ex} produced with Job OT will go into the household pool and half will go directly into his own Σq_{in} and Σq_{con} .

	(1) Approximate share of consumption expenditures	(2) Drawing rights against household pool
<u>Parent, one child:</u>		
Parent: \$3200/5000	.640	.64
Child: 1800/5000	.360	.36
	<u>1.000</u>	<u>1.00</u>
<u>Parent, two children:</u>		
Parent: 3200/6800	.471	.48
First child: 1800/6800	.265	.26
Second child: 1800/6800	.265	.26
	<u>1.001</u>	<u>1.00</u>
<u>Parent, three children:</u>		
Parent: 3200/8600	.372	.37
First child: 1800/8600	.209	.21
Second child: 1800/8600	.209	.21
Third child: 1800/8600	.209	.21
	<u>.999</u>	<u>1.00</u>
<u>Parent, four children:</u>		
Parent: 3200/10,400	.308	.32
First child: 1800/10,400	.173	.17
Second child: 1800/10,400	.173	.17
Third child: 1800/10,400	.173	.17
Fourth child: 1800/10,400	.173	.17
	<u>1.000</u>	<u>1.00</u>

Table 20, which follows, shows the allocation of total income among the four categories of behavioral capacities (cognitive, affective, psychomotor, and gross motor) by various age groups and Table 21 shows the allocation of equivalent dollar values of these capacities among the twelve purpose-oriented categories of activities or behavior settings.

Table 21 draws on the discussions presented in this treatise and in Table 20. The Table 21 figures for infants 0-1 (both sexes), for example, are averages of rows 1 and 2 from Table 20 and the allocation follows the rationale shown earlier.

Preliminary comments

Tables 20 and 21 embody a number of control totals. For example, the total living time of the 1500 residents of the community in the 366-day year will be $1500 (8784) = 13,176,000$ hours. Various demographic attributes of each individual have been specified; also, the number of hours each gainfully employed person spends at his work. The community has been synthesized by Karl A. Fox on the basis of data published for various aggregates of persons, by age, by sex and by socioeconomic class, and for 198 behavior setting "genotypes" which are aggregated from 884 behavior settings, in books and articles by Roger G. Barker and his associates.

Barker's published data emphasizes the 884 nonhousehold behavior settings which occurred in the town of Midwest in 1963-64, and the attributes of the 830 residents of the town. For example, Barker estimated that the total number of hours spent by all persons in

Table 20. Allocation of total income among four categories of behavioral capacities or behavior mechanisms, by population subgroups

Age	z_{cog}	z_{aff}	z_{psm}	z_{gm}	Total income Σz
0	266	530	266	266	1,328
1	371	742	371	371	1,855
2	746	746	498	498	2,488
3	835	834	556	556	2,781
4	1,011	1010	673	673	3,367
5	1,129	1129	753	753	3,764
6	1,586	1132	906	906	4,530
7	1,772	1266	1013	1013	5,064
8	1,981	1415	1132	1132	5,660
9	2,214	1582	1265	1265	6,326
10	2,652	1894	1515	1515	7,576
11	2,964	2117	1693	1693	8,467
12	3,785	1893	1893	1893	9,464
13	4,230	2116	2116	2116	10,578
14	4,728	2365	2365	2365	11,823
15	5,286	2643	2643	2643	13,215
16	5,908	2954	2954	2954	14,770
17	6,603	3302	3302	3302	16,509
Males					
18-24	11,125	4000	4000	4000	23,125
25-34	11,846	4000	4000	4000	23,846
35-54	12,595	4000	4000	4000	24,595
55-64	9,373	4000	4000	4000	21,373
65 & over	6,514	3256	3256	3256	16,282
Females					
18-24	6,382	3190	3190	3190	15,952
25-34	6,529	3264	3264	3264	16,321
35-54	7,232	3615	3615	3615	18,077
55-64	6,308	3155	3155	3155	15,773
65 & over	4,769	2385	2385	2385	11,924

Table 21. Allocation of equivalent dollar values of behavioral capacities among twelve purpose-oriented categories of activities or behavior settings, by population subgroups

Population subgroup and behavioral capacity	Equivalent dollar values of behavioral capacities used in specified activities				
	(1)	(2)	(3)	(4)	(5)
	Regular jobs ^a	Other work-related	House-work	Child care	Shop-ping
<u>1. Infants, 0-1, both sexes</u>					
Total, four capacities	0	0	0	429	0
Cognitive	0	0	0	85	0
Affective	0	0	0	185	0
Psychomotor	0	0	0	75	0
Gross motor	0	0	0	84	0
<u>2. Preschool, 2-5, both sexes</u>					
Total, four capacities	0	0	0	495	0
Cognitive	0	0	0	146	0
Affective	0	0	0	164	0
Psychomotor	0	0	0	87	0
Gross motor	0	0	0	98	0
<u>3. Younger school, 6-8, both sexes</u>					
Total, four capacities	0	0	0	219	0
Cognitive	0	0	0	62	0
Affective	0	0	0	69	0
Psychomotor	0	0	0	40	0
Gross motor	0	0	0	48	0
<u>4. Older school, 9-11, both sexes</u>					
Total, four capacities	42	4	0	301	0
Cognitive	20	1	0	87	0
Affective	5	1	0	95	0
Psychomotor	9	1	0	54	0
Gross motor	8	1	0	65	0
<u>5. Adolescents, 12-17, both sexes</u>					
Total, four capacities	383	40	0	0	0
Cognitive	189	11	0	0	0
Affective	41	7	0	0	0
Psychomotor	84	10	0	0	0
Gross motor	69	12	0	0	0
<u>6. Males, 18-24</u>					
Total, four capacities	8527	856	729	135	795
Cognitive	4882	293	251	51	407
Affective	888	159	68	37	55
Psychomotor	1529	183	157	21	128
Gross motor	1228	221	253	26	205

^aTotal Job OT in FB data set.

Equivalent dollar values of behavioral capacities used in specified activities							
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Night sleep & naps resting	Other personal care	Educa- tion	Organi- zations	Recrea- tion	Active leisure	Passive leisure	Total, all activities
0	189	0	0	53	681	241	1,593
0	42	0	0	11	117	64	319
0	69	0	0	23	255	104	636
0	37	0	0	9	156	42	319
0	41	0	0	10	153	31	319
0	278	112	33	151	1454	577	3,100
0	88	59	11	44	365	217	930
0	76	19	10	51	423	187	930
0	53	19	7	26	330	98	620
0	61	15	5	30	336	75	620
0	504	1245	47	329	1906	835	5,085
0	156	673	16	94	468	311	1,780
0	129	186	13	103	514	257	1,271
0	99	214	10	60	446	148	1,017
0	120	172	8	72	478	119	1,017
0	695	1724	129	452	2970	1139	7,456
0	218	940	44	131	740	429	2,610
0	178	256	36	142	802	349	1,864
0	136	293	27	81	690	200	1,491
0	163	235	22	98	738	161	1,491
0	1374	3900	210	983	4096	1739	12,725
0	464	2226	77	309	1104	710	5,090
0	299	478	50	266	947	457	2,545
0	274	657	46	183	977	314	2,545
0	337	539	37	225	1068	258	2,545
0	3385	1416	313	2311	1790	2868	23,125
0	1372	909	136	873	592	1359	11,125
0	749	165	74	634	430	741	4,000
0	573	190	57	365	371	426	4,000
0	691	152	46	439	397	342	4,000

Table 21. (continued)

Population subgroup and behavioral capacity	Equivalent dollar values of behavioral capacities used in specified activities				
	(1) Regular jobs	(2) Other work- related	(3) House- work	(4) Child care	(5) Shop- ping
7. <u>Males, 25-34</u>					
Total, four capacities	10924	1090	1038	385	839
Cognitive	6377	383	370	148	441
Affective	1175	212	102	109	61
Psychomotor	1866	224	216	58	129
Gross motor	1506	271	350	70	208
8. <u>Males, 35-54</u>					
Total, four capacities	11851	1165	1153	389	731
Cognitive	7108	426	429	155	397
Affective	1245	224	113	108	52
Psychomotor	1939	232	234	56	108
Gross motor	1559	281	377	70	174
9. <u>Males, 55-64</u>					
Total, four capacities	9336	974	1807	61	762
Cognitive	5008	301	571	21	366
Affective	1171	211	200	19	64
Psychomotor	1777	213	406	10	130
Gross motor	1380	249	630	11	202
10. <u>Males, 65 and over</u>					
Total, four capacities	330	34	2396	192	1274
Cognitive	180	11	769	69	620
Affective	33	6	212	51	85
Psychomotor	69	8	591	35	238
Gross motor	48	9	824	37	331
11. <u>Females, 18-24</u>					
Total, four capacities	2867	299	1754	563	862
Cognitive	1510	91	536	191	404
Affective	317	57	169	160	63
Psychomotor	605	73	430	102	162
Gross motor	435	78	619	110	233
12. <u>Females, 25-34</u>					
Total, four capacities	2094	214	2591	1286	1094
Cognitive	1125	67	822	448	527
Affective	231	41	253	367	81
Psychomotor	438	52	640	232	205
Gross motor	300	54	876	239	281

Equivalent dollar values of behavioral capacities used in specified activities							
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Night sleep & naps resting	Other personal care	Educa- tion	Organi- zations	Recrea- tion	Active leisure	Passive leisure	Total, all activities
0	3162	606	355	1662	1343	2442	23,846
0	1309	394	157	639	455	1173	11,846
0	724	73	87	472	336	649	4,000
0	511	77	61	249	266	343	4,000
0	618	62	50	302	286	277	4,000
0	4135	177	499	1263	1061	2173	24,595
0	1776	118	229	505	375	1077	12,595
0	934	21	120	354	263	566	4,000
0	646	21	83	183	204	294	4,000
0	779	17	67	221	219	236	4,000
0	3514	141	482	1250	1390	1656	21,373
0	1289	85	189	422	411	710	9,373
0	904	20	133	395	385	498	4,000
0	610	20	90	200	292	252	4,000
0	711	16	70	233	302	196	4,000
0	2943	63	728	1635	1626	5061	16,282
0	1133	39	301	588	506	2298	6,514
0	625	7	166	432	372	1267	3,256
0	580	10	154	301	388	882	3,256
0	605	7	107	314	360	614	3,256
0	3141	301	327	2003	996	2839	15,952
0	1146	180	128	679	292	1225	6,382
0	721	38	81	569	245	770	3,190
0	613	48	69	363	234	491	3,190
0	661	35	49	392	225	353	3,190
0	3089	215	361	1636	795	2946	16,321
0	1158	131	145	570	240	1296	6,529
0	712	27	89	467	197	799	3,264
0	601	34	75	295	187	505	3,264
0	618	23	52	304	171	346	3,264

Table 21. (continued)

Population subgroup and behavioral capacity	Equivalent dollar values of behavioral capacities used in specified activities				
	(1)	(2)	(3)	(4)	(5)
	Regular jobs	Other work- related	House- work	Child care	Shop- ping
13. <u>Females, 35-54</u>					
Total, four capacities	4399	461	2929	723	1238
Cognitive	2312	139	906	240	585
Affective	549	99	322	227	104
Psychomotor	904	109	709	125	229
Gross motor	634	114	992	131	320
14. <u>Females, 55-64</u>					
Total, four capacities	4094	429	2831	282	1086
Cognitive	2156	129	881	93	516
Affective	531	96	326	91	95
Psychomotor	821	100	679	48	199
Gross motor	578	104	945	50	276
15. <u>Females, 65 and over</u>					
Total, four capacities	141	14	2413	101	1191
Cognitive	78	5	805	37	596
Affective	15	3	232	28	86
Psychomotor	29	3	591	18	219
Gross motor	19	3	785	18	290
16. <u>Adults, 18-24, both sexes</u>					
Total, four capacities	5694	578	1242	350	830
Cognitive	3195	192	394	121	406
Affective	602	108	118	99	60
Psychomotor	1066	128	294	62	145
Gross motor	831	150	436	68	219
17. <u>Adults, 25-34, both sexes</u>					
Total, four capacities	6510	652	1815	835	967
Cognitive	3751	225	596	298	484
Affective	704	127	178	238	71
Psychomotor	1152	138	428	145	167
Gross Motor	903	162	613	154	245
18. <u>Adults, 55-64, both sexes</u>					
Total, four capacities	8121	810	2043	556	985
Cognitive	4710	282	668	197	491
Affective	896	161	218	168	78
Psychomotor	1420	170	472	91	169
Gross Motor	1095	197	685	100	247

Equivalent dollar values of behavioral capacities used in specified activities							
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Night sleep & naps resting	Other personal care	Educa- tion	Organi- zations	Recrea- tion	Active leisure	Passive leisure	Total, all activities
0	3250	110	596	1334	1000	2037	18,077
0	1168	65	229	442	289	857	7,232
0	832	16	163	419	274	610	3,615
0	610	17	120	231	226	335	3,615
0	640	12	84	242	211	235	3,615
0	2834	66	573	998	1152	1428	15,773
0	1016	39	220	329	332	597	6,308
0	752	10	162	324	327	441	3,155
0	522	10	113	169	256	230	3,155
0	544	7	78	176	237	160	3,155
0	1976	33	737	1100	1321	2897	11,924
0	774	21	308	401	419	1325	4,769
0	446	4	178	308	322	763	2,385
0	379	5	151	196	308	486	2,385
0	377	3	100	195	272	323	2,385
0	3261	858	320	2157	1394	2854	19,538
0	1259	544	132	776	442	1292	8,753
0	734	101	77	602	338	756	3,595
0	593	119	63	364	303	458	3,595
0	675	94	48	415	311	348	3,595
0	3125	411	358	1648	1070	2693	20,084
0	1233	263	151	604	348	1235	9,188
0	718	50	8	469	266	723	3,632
0	556	55	68	272	227	424	3,632
0	618	43	51	303	229	311	3,632
0	3693	144	547	1299	1030	2106	21,334
0	1472	92	229	473	332	967	9,913
0	883	18	142	387	268	588	3,807
0	628	19	101	207	215	315	3,807
0	710	15	75	232	215	236	3,807

Table 21. (continued)

Population subgroup and behavioral capacity	Equivalent dollar values of behavioral capacities used in specified activities				
	(1)	(2)	(3)	(4)	(5)
	Regular jobs	Other work- related	House- work	Child care	Shop- ping
19. <u>Adults, 55-64, both sexes</u>					
Total, four capacities	6714	702	2318	173	924
Cognitive	3582	215	726	57	441
Affective	850	154	263	56	80
Psychomotor	1304	157	542	29	164
Gross motor	978	176	787	31	239
20. <u>Adults, 65 and over, both sexes</u>					
Total, four capacities	235	24	2403	146	1233
Cognitive	129	8	787	53	608
Affective	24	4	222	39	86
Psychomotor	48	6	591	27	228
Gross motor	34	6	803	27	311
21. <u>Adults, 18-64, both sexes</u>					
Total, four capacities	6765	684	1854	478	925
Cognitive	3812	228	596	168	455
Affective	764	137	194	140	72
Psychomotor	1236	148	434	82	161
Gross motor	953	171	630	88	237
22. <u>Males, 18-64</u>					
Total, four capacities	10160	1021	1181	242	782
Cognitive	5844	351	405	94	403
Affective	1119	202	121	68	58
Psychomotor	1778	213	253	36	124
Gross motor	1419	255	402	44	197
23. <u>Females, 18-64</u>					
Total, four capacities	3365	350	2524	715	1071
Cognitive	1776	106	786	243	508
Affective	407	73	267	212	86
Psychomotor	695	83	614	127	199
Gross motor	487	88	857	133	278
24. <u>Adults, 18 and over</u>					
Total, four capacities	5458	553	1964	412	988
Cognitive	3074	184	634	145	486
Affective	615	111	200	120	75
Psychomotor	999	120	465	71	175
Gross motor	770	138	665	76	252

Equivalent dollar values of behavioral capacities used in specified activities							
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Night sleep & naps resting	Other personal care	Educa- tion	Organi- zations	Recrea- tion	Active leisure	Passive leisure	Total, all activities
0	3171	103	527	1125	1272	1542	18,571
0	1152	62	204	376	372	653	7,840
0	825	15	148	360	356	470	3,577
0	566	15	101	184	274	241	3,577
0	628	11	74	205	270	178	3,577
0	2457	49	733	1367	1474	3980	14,101
0	952	30	305	494	463	1812	5,641
0	535	6	172	370	347	1015	2,820
0	479	8	152	248	348	685	2,820
0	491	5	104	255	316	468	2,820
0	3314	379	438	1557	1191	2298	19,883
0	1279	240	179	557	373	1037	8,924
0	719	46	114	454	307	634	3,653
0	586	52	83	257	255	359	3,653
0	658	41	62	289	256	268	3,655
0	3548	585	413	1622	1395	2286	23,235
0	1436	376	178	610	458	1080	11,235
0	827	70	104	464	353	614	4,000
0	585	77	73	249	283	329	4,000
0	700	62	58	299	301	263	4,000
0	2078	172	465	1493	986	2312	16,531
0	1122	104	181	505	288	994	6,613
0	754	22	124	445	261	655	3,306
0	586	27	94	265	226	390	3,306
0	616	19	66	278	211	273	3,306
0	3142	312	496	1519	1247	2634	18,725
0	1214	198	204	545	391	1192	8,267
0	750	38	125	437	315	710	3,486
0	564	43	97	255	273	424	3,486
0	624	33	70	282	268	308	3,486

Table 21. (continued)

Population subgroup and behavioral capacity	Equivalent dollar values of behavioral capacities used in specified activities				
	(1) Regular jobs	(2) Other work- related	(3) House- work	(4) Child care	(5) Shop- ping
25. <u>Males, 18 and over</u>					
Total, four capacities	8194	823	1424	232	880
Cognitive	4710	283	478	89	446
Affective	903	162	139	65	64
Psychomotor	1436	172	321	36	146
Gross motor	1145	206	486	42	224
26. <u>Females, 18 and over</u>					
Total, four capacities	2720	283	2503	592	1094
Cognitive	1437	86	790	502	525
Affective	328	59	260	175	86
Psychomotor	562	67	610	105	203
Gross motor	393	71	843	110	280

Equivalent dollar values of behavioral capacities used in specified activities							
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Night sleep & naps resting	Other personal care	Educa- tion	Organi- zations	Recrea- tion	Active leisure	Passive leisure	Total, all activities
0	3428	481	476	1624	1442	2840	21,844
0	1376	309	203	605	468	1324	10,291
0	787	57	116	457	357	744	3,851
0	584	64	89	260	304	439	3,851
0	681	51	68	302	313	333	3,851
0	2857	145	519	1415	1053	2429	15,610
0	1052	87	206	484	315	1060	6,244
0	692	19	135	418	273	677	3,122
0	545	23	105	251	242	409	3,122
0	568	16	73	262	223	283	3,122

Midwest's 884 "public" behavior settings was 1,880,730 hours, of which 1,125,134 hours were supplied by the 830 residents of Midwest and the remainder by nonresidents. It is clear that most of the nonresidents live in the school district, church attendance areas, and trade area within five miles of the town; for example, slightly more than half of the occupancy time in Midwest's elementary school is supplied by "nonresidents" of the town itself.

We decided to contrast a hypothetical "closed community" consisting of the 830 residents of Midwest and 670 residents of the immediately surrounding area (about 50 square miles), or 1500 persons in all. In constructing 114 rural farm households and 95 rural nonfarm households in the surrounding area, we used marginal distributions from the 1960 and 1970 population censuses and the 1964 Census of Agriculture for Barker's county. We believe the resulting "statistical community" embodies most of the relevant attributes of the actual town and trade area of Midwest as of 1963-64.

CHAPTER VII. CONCLUSIONS

The pilot accounts shown are in a preliminary form; however, one can easily see how such accounts may be used for policy purposes:

- a) From an analysis of occupancy time in various behavior settings we can see the relative usefulness of various settings as perceived by members of the community.
- b) We can also find out which particular age groups constitute the clientele for various kinds of behavior settings. This would facilitate policy decisions. For instance, when we find that most of the occupancy time in public behavior settings is accounted for by children and adolescents, deliberate public policy bringing about changes in the number and type of such settings would directly affect the children and the adolescents.
- c) Detailed models of households can be constructed. The initial estimates of drawing rights shown by us may be improved upon. It is possible to consider the break up of household total income into behavioral capacities and rewards.
- d) Similarly detailed models of schools, churches, retail stores, voluntary associations and other organizations may be constructed.
- e) We are in a position to view a social system in its totality. This approach allows us to estimate approximate values for the various kinds of rewards as well.

It is possible to visualize effects of various changes, such as, establishment of a new manufacturing plant, a new restaurant

or a beauty salon or the closure of existing settings.

- f) An allocation of money values of each category of behavioral inputs and outputs among an exhaustive set of time uses (categories of purpose-oriented activities or behavior settings) covering (1) major sectors of the economy and (2) major authority systems (private enterprises, government, schools, churches, voluntary associations and households) which constitute the social system as a whole is conceivable under this framework.
- g) The money values assigned to behavioral inputs and outputs for the population as a whole can be subdivided among age groups, sexes, and socioeconomic groups. The allocation of behavioral inputs to and rewards from categories of behavior settings for each population subgroup would summarize its life style.
- h) If we define the movement of the members of the society toward more rewarding life styles as economic and social development, a dynamic model based on the above approach would provide some kind of an index.
- i) It is possible to prepare total income accounts at all levels of aggregation, national, state and regional and local. Hence this would facilitate comparison and promote consistency.
- j) The human capital values assigned to various behavioral capacities would provide a basis for comparing the costs of various types of injuries and diseases causing chronic or permanent impairment of behavioral capacities--including the

long-term effects of pollutants in working environments and the environments of city streets, freeways, neighborhoods, and homes.

- k) Time series of these accounts may be developed to reflect changes in the allocation of behavioral resources and rewards over time among the major categories of purpose-oriented activities or behavior settings.
- l) This approach makes room for maximum use of existing published data on employment and hours of work, attendance at movies, theaters, museums, and sports events, number of passengers and passenger-miles on public transportation systems, etc., as is done in national income accounts. The behavior settings records do exist in various forms in some cases and the creation of time series on the use of time and behavioral inputs appears to be possible.
- m) Being complementary to the existing system of national income accounts, the proposed system will not threaten the tremendous investments embodied in the existing data systems.
- n) It would be possible to draw up some accounts for nonmarket systems such as churches, voluntary associations, and schools. A church-goer makes some inputs into the church-related setting and receives some rewards therefrom. The effectiveness of nonmarket systems may at some future point in time be viewed in this perspective. For educational institutions cost-benefit

studies have been made, but a study in this framework may be more revealing.

- o) Most of the public behavior settings are establishments or parts of establishments and these establishments can be identified with the Standard Industrial Classification Codes (SIC Codes). A small establishment such as a barber shop or a retail jewelry store is a behavior setting by itself. A large establishment with several departments is a cluster of behavior settings. Thus behavior settings can be added to the establishment level. The SIC Codes include schools, government agencies, religious organizations, and voluntary associations, as well as private enterprises.
- p) Occupation-specific computations are possible under this approach when DOT and HAJ information is considered.

The questions that may be posed are:

- a) Whether cross-section comparisons between various nations of the world can be made on this basis. If so, to what extent would our understanding of the behavior of the society, the economy and the polity of the various nations be improved by the use of this approach?
- b) Whether the approximations we have made for social system inputs and social system outputs are exhaustive. If not, what improvements are called for?
- c) Would time series of social accounts for a nation based on our concepts promote greater consistency in cost-benefit analysis

than that currently achieved?

d) Whether dynamic models can be constructed.

In fine, we may add that this is merely a modest beginning. As the concepts and methods undergo further refinements and further research explorations are made, the total income approach may be poised for a place of honor in our effort to envision the workings of a social system.

As Fox [29] has pointed out, various attempts have been made to combine economic and noneconomic variables in theoretical models. In the area of organization theory and industrial relations, important contributions have been made by several authors including Barnard [7], Simon [84], March and Simon [65], and March [64]. In the area of regional science, attempts are evidenced in Isard and associates [50]. They stated (pp. 494-497) that their conception of a social system draws heavily on the works of Talcott Parsons. Linder [62] noted that optimal allocation of time is quite analogous to optimal allocation of money income. Sirageldin [86] used household survey data from Morgan, Sirageldin and Baerwaldt [69] to estimate the value of nonmarket output and came to the conclusion that the average value of an American family's nonmarket output in 1964 was almost \$4,000, equivalent to about 50 percent of its disposable income; family disposable income averaged \$8,115 and family "full income" averaged \$12,045.

Fox [29, p. 51] felt that these approaches appear basically compatible and that there exists a considerable degree of convergence.

Gross [43] had cautioned that the maturation of social accounting concepts and methods is a time-consuming process. It will probably take several decades before an acceptable degree of perfection is attained in this field. Our attempt is an effort in this direction.

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