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GODWIN, DEBORAH D.

HUSBANDS' TIME ALLOCATION IN HOUSEHOLD PRODUCTION:
EFFECTS OF ECONOMIC, SOCIO-PSYCHOLOGICAL, AND SITUATIONAL
FACTORS

The University of North Carolina at Greensboro

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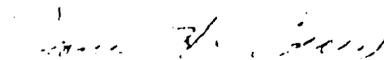
by

Deborah D. Godwin

A Thesis Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
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of the Requirements for the Degree
Doctor of Philosophy

Greensboro
1980

Approved by



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APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

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GODWIN, DEBORAH D. Husbands' Time Allocation in Household Production: Effects of Economic, Socio-psychological, and Situational Factors. (1980) Directed by: Dr. Jane H. Crow. Pp. 184.

The primary purpose of the study was to investigate the relationship between husbands' time inputs into household production and selected economic, socio-psychological, and situational factors. A simultaneous equations model of family time allocation was developed; it posited effects on husbands' household production time from husbands' wage rates, family income, wives' time inputs into home production, husbands' education, age and competence in household production, husbands' attitudes toward sex roles and interests in household production, and the age of the couples' youngest child. These relationships were tested holding constant situational factors, the season of the year and physiological/meteorological constraints on time use.

Time use data, reported by wives, were collected from 105 rural North Carolina families, selected according to a stratified random sampling plan. Two 24-hour time records were completed for the time use of all family members over six years old. Ordinary least squares (OLS), two-stage least squares (2SLS), and three-stage least squares (3SLS) regression techniques were utilized to test the hypothesized relationships.

Descriptive results of the study indicated that, despite popular assertions to the contrary, husbands spent relatively little time in all household production ($\bar{X} = 80$ minutes per day). When they did contribute time, it was likely to be in traditionally male-stereotyped

activities, home, yard, car, and pet care ($\bar{X} = 31$ minutes/day) and marketing and management ($\bar{X} = 24$ minutes/day). Husbands averaged 13 minutes in family care, 11.5 minutes in food preparation and clean-up activities, and virtually no time in clothing care and construction.

Weekly estimates of time inputs into each of these activities were computed for those spouses for whom was recorded one weekday and one weekend day (n=60) by weighting the weekday by five and the weekend day by two. This procedure analyzed estimated time use over a longer, conceptually more appropriate period.

Results for the OLS and 2SLS/3SLS estimation procedures were compared for husbands' time inputs into household production, market work, and leisure. Although the magnitude of the regression coefficients differed across estimation techniques, the direction of the signs of the significant coefficients and their statistical significance generally did not.

The factors which affected husbands' total household production time were wage rates, which had a negative effect, and family income, wives' time in home production, and husbands' interests in household tasks, all of which were positively related to husbands' time use. Although spouses' time inputs in all household production were complementary, the relationship varied across component activities. Husbands' time inputs into marketing and management tasks and home, yard, car, and pet care were complementary with wives', while the spouses' inputs were substitutes (albeit weak ones) in food preparation and clean-up and clothing care activities. The effects of other exogenous variables also varied across different components of household production time inputs.

The results generally confirmed the predictions of the model and replicated previous findings; the relative productivity of different uses of time (as measured by the wage rate, i.e., shadow price), as well as husbands' tastes (as measured by their interests in household production tasks) did affect the time allocation decisions of husbands.

The major contributions of this research to the analysis of the time allocation decisions of spouses are: (1) its use of both economic and socio-psychological explanations of factors affecting family members' time use; (2) its use of both a single equation and a simultaneous equations estimation technique for tests of these effects; (3) its detailed examination of the relationships between husbands' and wives' time inputs into total household production and into categories of household work; and (4) its inclusion of a more comprehensive definition of household production than in previous studies.

ACKNOWLEDGMENTS

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Words cannot adequately express the acknowledgment due my mother, the source of unfailing encouragement and support, and Al, each of whom know the extent of their contribution and of my thanks.

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CHAPTER I

INTRODUCTION

Time allocation decisions of family members have been a focus of interest to economists, sociologists and home economists since at least the early 1900's. Economists, until recently, have generally focused on the allocation of time to labor market work, the classical dichotomy of labor versus leisure, and factors that affect individuals' labor supply. Sociologists and anthropologists have concentrated on individual and family role behavior. When they have investigated household work, their focus has generally been on roles and the division of labor between spouses assessed in some unit other than time. Home economists have viewed time use as a measure of the output of home production; until recently, however, efforts have been limited to a description of the time spent in household production of family members, particularly homemakers.

Since the introduction of Becker's (1965) theory of the allocation of time, interest in explaining the dynamics of the allocation of time for household production has increased. Several researchers (Bloch, 1973; Leibowitz, 1974; Gronau, 1976, 1977; Hunt & Kiker, 1978; and Nickols & Metzen, 1978) have recently investigated some aspect of the family's time allocation decision or factors affecting time inputs into household production. Wives' time use in home production has been the focus of much work; less attention, scholarly and speculative, has been paid to husbands' time in home production.

The interrelatedness of time use decisions of family members and the substitutability of work efforts between couples has not been wholly unrecognized. Mincer (1962) observed that a decision of one family member to increase hours of market work may result in increased hours of leisure for other members of the family. Analyzing the allocation decision as a dichotomous one between labor and leisure, however, omits an important component of the process of the production of utility for family members, i.e., household production.

Becker (1965) maintains that the relative productivity of husbands and wives at labor market and household work determine their allocation of time in both spheres. In addition to a lack of available data, empirical work testing this proposition has been limited by several deficiencies. Time use data have generally been available for only one family member, usually the homemaker. When data on husbands' time use have been available, the definition of household production has excluded a number of activities in which husbands generally participate (e.g., Hunt & Kiker, 1978; Nickols & Metzen, 1978), thereby underestimating husbands' contributions to the household production unit. When investigations into the demand for all family members' time inputs have been done, the dependent variable of time use has generally been a crude estimate, based on a yearly recall of time use; moreover, important explanatory variables have omitted or only crudely estimated.

A final limitation in the previous work on demand for time inputs into household production arises from the lack of interdisciplinary efforts at theory-building and empirical analysis. Economists have

been concerned with the treatment of the family as a unit of production which functions like a small factory, combining inputs of market-purchased goods and services and time of family members to produce its output--utility or satisfaction for the family. Accordingly, their models have paralleled classical demand functions, which focus on the effects of prices and income on time allocation, and hold constant, among other things, individuals' preferences or "tastes." Aside from a few attempts (Hunt & Kiker, 1978; Gronau, 1976) to include family composition variables and human capital variables, such as age and education, economists have ignored "soft" data that undoubtedly affect family time allocation. Many of the factors upon which sociologists would focus are assumed away under the guise of ceteris paribus ("other things being equal").

Likewise, sociologists and home economists have made few attempts to explore the effects of economic variables in their explanations of the dynamics of family time allocation. Generally, their efforts have focused on merely describing either the amount of time spent in various tasks or the "division of labor" in the household by such variables as the number and age of children and the employment status of the wife. Few attempts have been made at formulating and analyzing testable hypotheses concerning the effects of attitudes, interests, family composition, and other sociological variables on time allocation decisions.

In this study, an attempt will be made to provide a more comprehensive treatment of the allocation of time for household production by exploring several dimensions of this complex process. The general

model will be based on the economic theory of Becker (1965) because of its usefulness in generating conceptually based explanations and testable hypotheses of the dynamics of time allocation of family members. Of primary interest will be the effects of wage rates and income on husbands' time in home production and the complementarity/substitutability of non-market work efforts of husbands and wives. Also investigated, however, will be the effects of additional productivity and taste variables--education, age, attitudes toward sex roles, interests and competence in household work, and family composition--on the allocation of time for household production. Additional variables not available in other studies, exogenous constraints, such as day of the week, season of the year, and the existence or non-existence of situational factors (physiological, meteorological, etc.) that affect time use, will also be controlled.

Reasons are numerous for maintaining that the investigation of factors related to husbands' time use is timely and important. The economic conditions surrounding husbands' and wives' labor market work decisions and, therefore, their allocation of time to non-market uses have undergone recent change. The increase in women's labor force participation, the movement of families from farms to urban and suburban areas, the introduction of technological advances in household equipment, and a decline in the fertility rate of families all may be expected to influence time spent for household production (Vanek, 1974).

Not only have there been changes in the economic factors affecting household work patterns, but changes in individuals' attitudes

toward sex roles are widely assumed to have occurred. The influence of the feminist movement, through its impact on sex role expectations of individuals, is thought to have affected the household division of labor. As Lynch (1975) explains, "If male-female distinctions in household work are disappearing it would be 'easier' for boys, girls, and fathers to step outside their 'role' and take a greater portion of the household work load" (p. 2). These changes in sociological factors, occurring simultaneously with changes in economic factors, may have affected not only individuals' productivity in household production (and market work) but also their "tastes" for household work.

The time allocation decisions of family members are clearly related to a complex set of factors, some economic, some sociological, and some exogenous situational constraints. Neither narrow economic explanations nor vague sociological speculations are satisfactory. This study is an attempt to evaluate the usefulness of both productivity and taste variables in explaining time allocation of husbands to household production, while holding constant the effects of exogenous situational constraints.

Purposes

Ideally, a study purporting to explain the time allocation of families would include not only the time inputs of all household members but also their time in all activities--labor market work, household production, and leisure. Time use in one activity clearly affects the availability and productivity of time for use in other

activities. The time use of one family member also undoubtedly affects other family members' time use. While consideration of each of these realities will be made in the development of the model of this study, empirical investigation of all the complex interrelationships of all family members' time use is beyond its scope.

Instead, the study will focus on husbands' time inputs into household production, defined as those purposeful activities which are inputs into the production of goods and services that produce utility for the family. The purposes of the study are:

- (1) To investigate and describe husbands' total time inputs into household production and into five categories of household tasks, as reported by wives, including food preparation and clean-up; marketing and management; home, yard, car, and pet care; clothing care and construction; and family care, both physical and non-physical.
- (2) To analyze the relationship between husbands' time inputs into all household production and into five categories of household tasks, as reported by wives, and selected economic, socio-psychological and situational factors.

A model, developed and presented in Chapter Three, describes the relationships and hypotheses to be empirically tested. In brief, those variables of particular interest which affect husbands' time inputs into household production are husbands' wage rates, family income, wives' time inputs into household production, husbands' age and education and competence at household production, husbands' interests and

attitudes toward household production, and age of youngest child. Exogenous situational factors to be controlled are day of the week, season of the year, and the existence/non-existence of situational (physiological, meteorological) factors.

The major contributions of this study to the analysis of time allocation of family members to household production are: (1) it tests both economic and sociological explanations of factors affecting the use of time by spouses; (2) it tests the explanatory power of such factors by both a single equation estimation technique and a simultaneous equations model; (3) it examines the relationships between husbands' and wives' time inputs into total household production and into categories of household work; and (4) it employs a more comprehensive definition of household production than in previous studies.

Background of the Study

This study evolved from a larger study, "An Interstate Urban/Rural Comparison of Families' Time Use," initiated and directed by Dr. Kathryn Walker of Cornell University and administered by the NE-113 Technical Committee under the auspices of the U.S.D.A. Agricultural Research Service. North Carolina's cooperative effort was directed by Dr. Mohamed Abdel-Ghany, at The University of North Carolina at Greensboro. The objectives of the regional project were:

- (1) To establish a data bank for rural and urban families on use of time for household, paid and volunteer work and for non-work activities.
- (2) To compare similarities and differences in use of time in work (household, paid and volunteer) among rural and urban populations in various geographic areas in the United States.

- (3) To determine the extent of change in time use for household work, paid work, and volunteer work over the past decade. (Sanik, 1978, p. 5)

All methodological procedures and instruments were standardized for use by all eleven cooperating states: New York, North Carolina, Connecticut, Utah, Virginia, Louisiana, Oklahoma, Wisconsin, Oregon, California, and Texas. Additional research objectives and instruments were developed for use in the North Carolina project under the direction of Dr. Abdel-Ghany and the author of this study. The data used here are from the 105 rural families interviewed in the North Carolina study.

Limitations of the Study

As previously discussed, a comprehensive examination of the time allocation decisions of family members for market and non-market production, although desirable, is beyond the scope of this empirical analysis. Its focus, the household production time of husbands of two-parent, two-child families, represents but a part of the overall picture of time allocation in the family economy.

Although the use of two-parent, two-child families was essential for the interstate study and facilitates national and interstate comparisons based on other characteristics which reveal differences in time use, it is also a limitation. This study makes no attempt to investigate the time use of other types of families--single-parent families, childless couples, families with children over age 18--all of which are increasing in numbers. It may be argued that individuals in families other than the traditional parent-child families who have

chosen alternate life styles may have different patterns of division of labor within the home. Few conclusions can be made from this study about the time use of families other than the traditional parent-child families; other studies are required to expand the usefulness of this analysis to include alternate family forms.

This study employs reports of time use for all family members over age six made by the person defined as the homemaker, that individual primarily responsible for the operation of the household. Although this definition allowed for the reporting of family members' time by either husband or wife, in every family the wife was defined as the homemaker and, thus, reported her family's time use. It may be argued that wives' reports of others' time are less accurate than those of the individuals themselves would be. A wife's perception of a husband's activities may differ from his own perceptions. However, several reasons exist for assuming that the limitation caused by this measurement procedure is of less concern than it may seem: (1) a majority of the activities that are included in household production are directly observable events that are measured in relatively objective units; (2) strict and detailed cross-referenced definitions of tasks to be included in household production activities were provided to the reporting spouse; and (3) the wife was instructed to clarify any doubts about the others' activities, by asking the individual in question, in the time interval between the two interviews. When compared to the problems of having each family member report his/her own time, the problems of measurement bias created by the under- or over-reporting of family members' time by one reporter seem less

objectionable. However, the data on husbands' time use, as noted earlier, are reported by wives.

A final limitation is the use of only rural subjects for the analysis of time allocation of families. It may be argued that significant differences exist in the populations of rural and urban areas with respect to their allocation of time. However, Sanik (1978), comparing the time use for all household production of rural and urban New York families, found no significant differences by area of residence. Only in time spent by all family members in the physical care of family members did rural families spend significantly more time than urban families. Data from the larger interstate study may be used to further investigate these differences or lack of differences.

CHAPTER II

REVIEW OF LITERATURE

Economists, home economists and sociologists have all viewed the allocation of time within the family from different perspectives. Economists, until recently, have focused on the time use of family members as a dichotomous choice between labor market work and leisure and have concentrated on the development of models predicting the amounts of time spent in each activity. Home economists have long been interested in the empirical analysis of family members' time use in household production but have not developed the theoretical framework for such analyses. With the development of Becker's (1965) theory of the allocation of time and the "new" family economics, family members' time use for household production has become the subject of more integrated theoretical and empirical work by both economists and home economists.

Sociologists have focused on the division of labor between husbands and wives, most often as a measure of the degree of equalitarianism in the marital relationship. Role behavior and expectations have provided the framework within which sociologists have explored such questions as who has the responsibility for completing which roles and what tasks. Important differences in their purposes and their methods prevent strict comparison of these studies with the economic analyses and the present research. However, some empirical analyses which have implications for the study of the time allocation

of family members will be reviewed. After reviewing the perspectives of economists and sociologists in studying household production and division of labor, the definition and measurement of household production will be discussed. Finally, descriptive and predictive studies of husbands' time inputs into household production will be discussed.

Time Allocation in Economic Thought

In historic economic thought, the division of labor between the sexes in household and labor market production has been depicted as resulting from industrialization and the concomitant specialization of labor. Boserup (1970) reports that in economic systems where agricultural production was predominant, such as the cottage-industry system of Renaissance England, there was supposedly little distinction between "men's work" and "women's work;" both sexes worked shoulder to shoulder to produce a meager subsistence level of living. However, even in totally agrarian economic systems, Boserup maintained, there was some task distinction and division of labor based on sex.

According to Kyrk (1953) the onset of industrialization plus the physical separation of household and labor market work precipitated a more rigid division of labor. While women's work centered on the home, many tasks formerly done by women in the home were shifted to the male-dominated market sector, where the advantages of mechanization and specialization of labor could be realized. With the market sector taking over what had previously been done in the home, the wives' responsibility shifted from an equal role in the production of goods to the nurturance-maintenance activities associated with an increasing level of consumption. Added to the women's role was

responsibility for increasingly complex consumer and household management tasks.

In recent decades, of course, women have been entering the labor market in record numbers. Darling (1975) asserted that whereas women have now entered the labor market and a large number of them now share the breadwinner role, it is not true that the reciprocal situation exists. Men, on any large scale, have not shared responsibility for household production activities. Although classical economists have long been concerned with the allocation of time to the labor market by both men and women, they have until recent times generally ignored the allocation of time to non-market activity. In fact, with few exceptions, even in conceptual discussions, economists have viewed the time allocation decision as a dichotomous choice between "work," namely market production for money, and "leisure" or all other activity.

Neo-classical theory of labor supply is based on the idea that individuals' earnings result from their employment of their resources or factors of production, the most important of which is an individual's time. In his resource-owning role, each individual must decide how to allocate those resources, human and non-human, among various market and non-market uses. An individual's equilibrium exists when the amount of additional income (assumed to come from labor market work) the individual is willing to sacrifice for an extra unit of leisure just equals the income for which he is able (permitted by the market wage he can command) to exchange an hour of leisure.

This theory postulates that a higher wage rate for labor market work generates two contradictory effects--a substitution effect and an income effect. When the substitution effect of a price (wage) change is considered alone, i.e., when real income is held constant, a price increase induces a decrease in quantity purchased. In the work-leisure example, an increase in the wage rate means that the price or opportunity cost of leisure is higher; thus, less leisure will be "purchased" and the individual will supply more hours of labor market work.

The contradictory effect, the income effect, however, also affects the time allocation decision. Any increase in wages increases the individual's income. Since leisure is a normal good, the demand for which increases as income rises, the income effect results in an individual purchasing more leisure and supplying fewer hours of labor market work. Thus, the income and substitution effects operate in opposite directions; the magnitude of each determines the final direction of the effect of a wage change upon the individual's time allocation. As Hirshleifer (1976) explained, however, "despite the importance of the income effect, the substitution effect must nevertheless dominate the labor supply decision at very low wage rates" (p. 385). Only at higher wage rates does the effect of extra hours of work intensify the income effect substantially enough so that it might outweigh the positive substitution effect of a wage increase.

Many relevant labor supply questions are empirical in nature and cannot be determined a priori. The implications of this theory are that, as the productivity of women's labor market work increases

(because of increases in educational attainment and experience resulting from continuous labor force attachment) with an accompanying increase in the wage rate they can command, the relative marginal productivities of men and women at market work will change. Women (and secondary or marginal male workers) will be induced by their higher opportunity costs of leisure to supply more hours of labor market work and spend less time in leisure. However, an important conceptual and empirical omission, namely the exclusion of household production, results from this type of analysis.

The "New" Economics of the Family

Since the mid-1960's there has arisen a new type of economic approach begun by Gary Becker and adapted by subsequent economic analysts. It is not so much a single theory as it is an approach to the problem of study. Believing that the economic approach was uniquely powerful in analyzing a wide variety of theretofore unexamined subjects (at least by economists), Becker introduced economic analysis to the study of many types of non-market behavior--from economic discrimination, fertility, crime and punishment, marriage and mate selection, and the allocation of time.

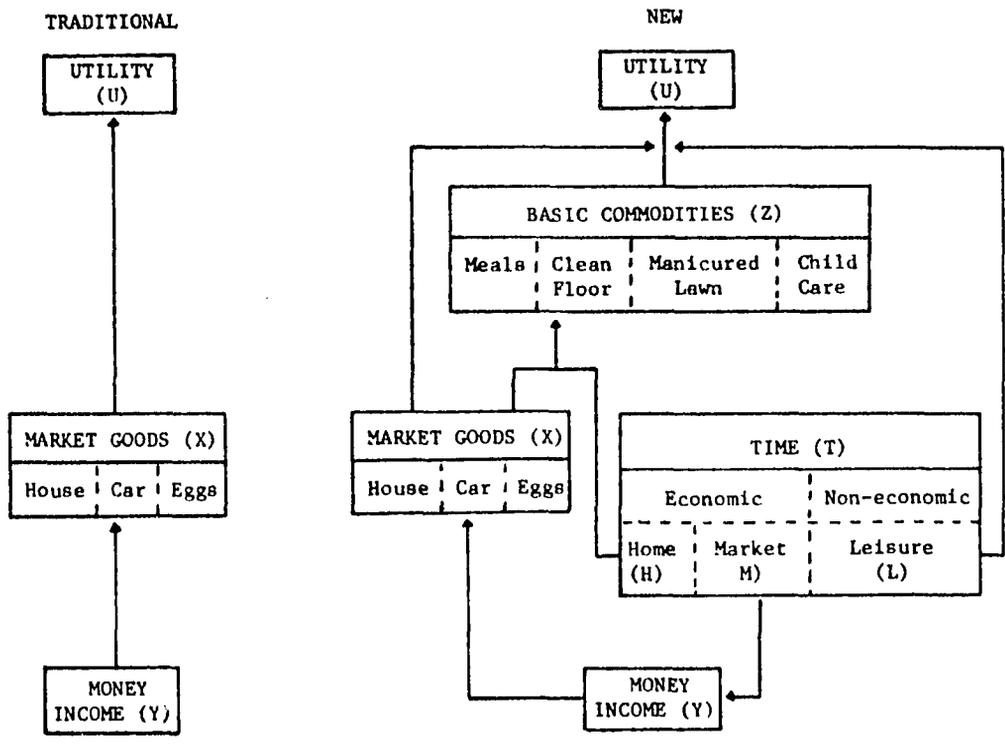
The assumptions basic to his approach are three: (1) that some entity, whether individual, firm, family, or government, employs "maximizing" behavior, whether the phenomenon to be maximized is utility, profits, or wealth; (2) that markets coordinate the behavior of the participants in the process such that, through the provision of quantity and price decision-making mechanisms, some equilibrium is

attainable; and (3) that the underlying preferences of individuals, such as health, prestige, benevolence, etc., (called values by home economists) are stable over time (Becker, 1976). The final assumption, he maintained, is essential because it allows the economic approach to provide a stable framework for generating predictions and theory, thus preventing the use of catch-all explanations based upon "irrational behavior" or illogical choice.

Realizing that with a secular decline in the labor market work week the allocation of non-market time was becoming increasingly important, Becker began an attempt to give non-market time the attention it deserved. The basic tenet of this approach is that households are producing as well as consuming units; they produce, through the combination of market goods and time inputs of their members, more basic commodities which result in utility for their members. Although this theory will be fully developed and explained in Chapter Three, it is useful to illustrate here the basic differences in the traditional utility-maximization theory and Becker's modifications, as illustrated in Figure 1.

In traditional thinking, families maximize utility through the consumption of market goods purchased in some optimal combination by a given money income. In Becker's approach households combine a variety of market goods and services with their own members' time to convert the market goods to a form in which they provide utility for the family, i.e., the basic commodities or Z's. One such commodity Z would be clean, wrinkle-free clothes, which require the use of market goods, both durables (washer, dryer, iron, etc.) and

Figure 1
Theories of Household's Production of Utility



Maximize Utility:

$$U = f(x_1, x_2, \dots, x_n)$$

Subject To:

$$Y = \sum_{i=1}^n p_i x_i$$

(Income Constraint)

- U = Utility of the Family
- n = Number of Goods
- x_i = Quantity of Good i
- p_i = Price of Good i
- Y = Money Income

Maximize Utility:

$$U = f(L_1, L_2, Z_1, \dots, Z_n)$$

Subject To:

$$Z_i = f(H_1, H_2, x_1, \dots, x_n) \quad \text{Household Production Technology}$$

$$v = \sum_{i=1}^n p_i x_i \quad \text{Income Constraint}$$

$$Y = w_1 M_1 + w_2 M_2 \quad \text{Wage Transformation}$$

$$T_i = M_i + H_i + L_i \quad \text{Time Constraints}$$

- Z_i = Basic Commodity i
- H_i = Time in Household Production of i
- M_i = Time in Market Work of i
- L_i = Time in Leisure of i
- w_i = Wage Rate of i in Market Work

non-durables (water, laundry detergent) and the time of the family doing the laundry. Another commodity Z would be the viewing of a movie, which requires the inputs of a theater, celluloid film and the moviegoer's time.

The vector of Z's is produced subject to two constraints, a time constraint (actually a time constraint for each family member) and an income constraint. In this depiction, money income is produced through the wage transformation combining family members' time in market work and their wage rates. Market goods and family members' time inputs are also an input into leisure, which produces direct utility for the family.

Central to Becker's approach is the idea that two prices are attached to each commodity consumed by the family--a monetary price established by the market and a time price associated with the transformation of the good or service into a form more usable by the family.

The so-called new economics of the family emphasized that the time of different family members is their primary scarce resource and replaces the assumption that families are passive consumers of what they purchase with an assumption that families both produce and consume objects of choice, called "commodities," using inputs of their own time and purchased goods and services.
(Becker, 1974, p. 317)

The prices of Z's are measured according to a concept of full income--the total of money income and opportunity costs, that income foregone from other uses of time. As Becker (1976) explains:

Prices, be they the money prices of the market sector or the "shadow" imputed prices of the nonmarket sector, measure the opportunity cost of using scarce resources, and the economic approach predicts the same kind of response to shadow prices as to market prices. (p. 6)

In equilibrium, even the ratio of shadow prices of all the basic commodities, namely the time required to change a commodity by x units, must equal the ratio of marginal utilities to the family of the commodities. In short, the ratio of marginal opportunity costs must equal the ratio of marginal utilities for all commodities for the family to be in its "preferred" position in the allocation of its time and its money income.

An increase in an individual's wage rate, with full income held constant (meaning that "other" income had declined), would make non-market time more expensive, thereby inducing a decline in consumption (non-market) time. Sometimes, less-time-intensive market goods and services could be substituted; other times, the time of a family member with lower market productivity would be substituted. Multi-person households do not only allocate time among the production of different commodities with different combinations of market goods, but they also determine the optimum allocation of time of all family members according to the relative marginal productivity of each member at each type of activity.

Members who are relatively more efficient at market activities would use less of their time at consumption activities than would other members. Moreover, an increase in the relative market efficiency of any member would effect a reallocation of the time of all other members toward consumption activities in order to permit the former to spend more time at market activities. (Becker, 1976, p. 108)

However, Becker failed to make the distinction between what he called "consumption" activities and household production activities. Still, the implications for the allocation of time of this theory are clear:

family members who are relatively more efficient at labor market activity will spend more time in paid work and family members who are relatively more efficient at household production will allocate more time to non-market work. It is important to note that in a family situation, it is the relative or comparative advantage of spouses, rather than their absolute levels of productivity at each type of activity, which determines their time allocation.

Household Division of Labor
In Sociological Thought

Inquiry within the disciplines of family sociology and anthropology about the division of labor within families has a long tradition. Within the context of the study of role expectations and behavior, sociologists and anthropologists have been concerned not only with who completes what roles or tasks (Blood & Wolfe, 1960; Komarovsky, 1946, 1973; Hoffman, 1963; Levinger, 1964; Aldous, 1969; Lopata, 1971; Baum, 1971; Lloyd, 1975; Albrecht, Bahr, & Chadwick, 1979), but who should complete what roles or tasks (Goode, 1960; Geiken, 1964; Mowrer, 1969; Clavan, 1972; Holter, 1972; Mason & Bumpass, 1974; Osmond & Martin, 1975; Giele, 1976; Araj, 1977; Albrecht et al., 1979). Much work has been done on aggregate role differentiation across countries and cultures (Murdock, 1937; Wallin, 1950; Parsons & Bales, 1955; Zelditch, 1955; Slater, 1961; Arnoff & Crano, 1975) and a plethora of recent studies have examined task and role differentiation empirically within families in different countries, including Finnish (Haavio-Manila, 1964), German (Pfeil, 1968; Lamouse, 1968), Mexican (Penalosa, 1968), Chinese (Hong, 1973), Iranian (Touba, 1975),

and Cuban (Richmond, 1976) families. In addition, numerous studies have focused on different aspects of roles and the division of labor within the family, among them attitude-behavior congruence (Araji, 1977), role behavior and marital satisfaction (Chadwick, Albrecht, & Kunz, 1976), husbands' market work involvement and marital performance (Clark, Nye, & Gecas, 1978), and the division of labor among different family forms (Stafford, Backman, & Dibona, 1977).

Much work, both commentary and empirical study, usually using some measure of role performance or division of labor, has focused specifically on the question of the degree of equalitarianism in families. There is sharp disagreement about whether or not there exists a trend toward the depolarization of roles and a more equal division of labor. It seems logical to some to assume that prevailing cultural norms, at least in modern societies, support equalitarianism in the division of labor within the family. Much evidence exists that families desire or aspire to some type of syncratic or equalitarian role pattern or "symmetrical" family (Lovejoy, 1961; Burgess & Locke, 1963; Goode, 1963; Blood, 1965; Hawkins, 1968; Winnick, 1968; Baum, 1971; Young & Willmott, 1973). Equally evident in a voluminous collection of literature is that the actual pattern of the division of labor within families is far from equal (Janeway, 1971; Holter, 1972; Miller, 1972; Safilios-Rothschild, 1972; Rapoport & Rapoport, 1976; Giele, 1976; Richmond, 1976; Clark et al., 1978). As Rapoport and Rapoport (1976) reported, "male involvement in the day-to-day responsibilities of running the household--accompanied by stabilized roles--is far less prevalent than is the supportive attitude" (p. 97).

Without exception, every empirical study surveyed reported that wives still have the primary responsibility for (and spend most of the time for) household work; husbands contribute very little time and shoulder minimal responsibility for work in the home. As Safilios-Rothschild (1972) summarized, "the myth that the American family is equalitarian, reflecting an ideal congruent with major American values, has been perpetuated despite all research to the contrary" (p. 64).

A review of all the social sciences literature which touches upon or has implications for the dynamics of the division of labor within the family is a practical impossibility. Its usefulness to the present research, in any case, is limited by several deficiencies. First, much of the literature contains impressionistic description and inference, at best based upon case studies with few controls or comparison groups or non-probability samples. Sweeping statements about the "blurring" of marital roles and the emergence of symmetrical families abound with little systematic evidence to support them.

Secondly, adequate measurement techniques and procedures in these studies have been rare. Without exception, the previously mentioned studies employ a measure of role or task performance or division of labor other than time inputs. Usually, inferences are made about the completion of certain sets of tasks or roles (i.e., the "housekeeping" role) from a single question, such as "Who usually completes this task (role)?" Inferences about attitudes or role expectations are generally derived from a similar question, "Who should complete this task (role)?" The typical response categories range from "husband always" or "husband entirely" to "wife entirely" or "wife always." Obvious

problems result from this procedure. First, self-reports are likely to be biased toward socially desirable responses (remember the equalitarian norm). Secondly, if it is used with individual tasks, aggregation across tasks to produce one score is somewhat misleading because there are infinite combinations of scores on individual items that could produce a single total score. The alternative is usually a disaggregated presentation (usually via percentages of respondents which answered in each response category) of who completes what tasks or a categorization of respondents into patterns of task completion, as is common in the literature of power in families. Such classification into "syncretic" and "autonomic" patterns overcomes the invalidity of aggregating scores, but it has yet to be employed in the literature on division of labor. If the single question format is used with roles instead of tasks, i.e., the "provider" role, the "housekeeper" role, it is unlikely that the measure is an adequate indication of the true state of affairs concerning the division of labor in the family.

A third limitation of the usefulness of sociological literature, closely related to the difficulties mentioned above, is the inadequacy of the statistical analysis and presentation. As mentioned before, percentages of respondents answering each response category is the usual extent of the analysis. Sometimes disaggregated percentages by various other factors, such as age, are presented.

Even omitting for a moment the methodological problems involved with the typical sociological studies of role performance and division of labor within families, there is a fourth, more basic difficulty.

Although some of these studies are theoretically grounded in that they claim to test a certain proposition or hypothesis suggested by a certain theory, none of these studies systematically analyzes the dynamics of the division of labor in the family, much less in terms of their time allocation. Few explanatory or control variables are entered into the analyses. None of the studies mentioned thus far employs multivariate models or statistics, partially because they are not fully developed conceptually and partially because of the aforementioned measurement problems. For the most part, they offer piecemeal explanation of behavior based on role expectations, as if they exist in isolation of all other factors or, worse, no explanation at all is given to the "why's" of spouses' behavior. Some discussions have used the resource theory (Blood & Wolfe, 1960), exchange theory (Heer, 1962, 1963; Blau, 1964; Edwards, 1969), and the theory of resources in a cultural context (Rodman, 1967), all of which were developed as explanations of power in family decision-making, to also explain the division of labor in families. (In fact, most of the relevant data on role performance and division of labor are a minor part of projects with other primary concerns, most often "power.") None of the studies, however, attempts to ground the analysis of spousal role performance or the division of labor in the family in theory in any systematic way.

To summarize, few studies in the sociological literature are useful for this analysis other than providing broad inferences about norms and role expectations of families. However, in very recent years there have been a few studies which have partially overcome the

conceptual and methodological difficulties of the previously discussed research. Although these studies, in varying degrees, suffer from the same limitations previously mentioned, there are some findings more applicable to this analysis. Primarily, these studies examined relationships between husbands' and wives' task completion or division of labor and various socio-demographic factors.

Richmond (1976), studying the Cuban population of Miami, used the Centers, Bertram, and Todriguez (1971) instrument (which, incidentally was developed from Blood and Wolfe's (1960) measure of task division) to investigate families' division of labor. Although the primary focus of the study was a test of the "theory of resources in a cultural context" concerning the decision-making in families, its findings on factors associated with the division of labor are relevant. These findings, however, should be interpreted in view of the limitations of the methodology: (1) measurement of task division was by questions on who does the tasks; (2) equal weight was given all tasks in the development of an "index" of division of labor; (3) a purposive sample of minority families with a unique cultural background, which limits the generalization of the findings, was used; (4) wives' reports were used, which makes this study fall "within the infamous category of 'wives' only sociology'" (Richmond, 1976, p. 265); and (5) simple bivariate correlations were primarily used to test only the univariate relationships between the families' division of labor and associated factors.

Richmond did, however, utilize some techniques which are of interest. First, she investigated the relationship between

socioeconomic factors and the division of labor with and without wives' ideology (that is, their scores in response to the "should" questions) partialled out. Secondly, she analyzed the relationship between families' division of labor and the relative resources of the spouses (job status, education, and "total" resources, including salary, knowledge of English, independence, age, and number and age of children). Variables significantly related to a more equalitarian division of labor included wife's salary, husband's salary, the number of children, and the relative job status of husband and wife when the wife's job status was ranked higher. As Richmond (1976) explained:

The wife's salary and having fewer children were the most effective resources in obtaining the husband's help with the housework. As one might expect, working wives received more aid than their non-working counterparts, but this help was still minimal in most instances and usually confined to grocery shopping and child care. (p. 263)

She explained that working wives received help because they were contributing relatively more resources and because they had less available time for housework. The negative association between husbands' contribution and the number of children was explained rather lamely: "perhaps the affective relationships between the spouses is greatest when there are fewer children and thus the husband is more likely to be willing to help with domestic chores" (Richmond, 1976, p. 263).

The relative resources (job status, education) of the spouses were also associated with the couples' division of labor. Wives with high salaries or salaries which were high relative to their husbands' received more help with housework whether or not the wives' ideology

was controlled. The most equal division of labor occurred in families where husbands' resources or both spouses' resources were low. As Richmond (1976) explained:

In such couples, the husband may have had more time and energy available for such tasks by not being committed to a demanding job or he may have felt that he must compensate in some way for his lack of other contributions. (p. 263)

When ideology was partialled out the effect of husbands' salary on his contribution was altered slightly; high-salaried husbands contribute slightly more and low-salaried husbands slightly less to the completion of household tasks when their ideology is controlled.

In summary, Richmond found some evidence that interrelationships exist between spousal resources--education, salary, job status--and their ideology and the amount of contribution of husbands and wives to household work. She even concluded, making an inferential leap unsupported by the data presented and the statistical methodology, that "the influence of the cultural norm adhered to by the couples seems to outweigh that of the influence of their resources except for the most extreme cases" (Richmond, 1976, p. 264). While this position is questionable, this study is notable as a preliminary attempt to investigate the interactive effects of socioeconomic factors and individuals' ideology on the division of labor within families.

A second study of husbands' work involvement and marital role performance (Clark, Nye, & Gecas, 1978) is notable for its conceptual basis and analytic techniques. Using a random sample of Seattle households, they analyzed the relationship between husbands' work time and his performance in marital roles by employing a multivariate model

which specified a general causal relationship among the variables. The variables included were spouses' education, husbands' income, wives' work time, and wives' role expectations, all of which either were expected to moderate the hypothesized relationships if not controlled or to moderate the effect of husbands' market work time on his role performance.

Using path analysis, a specialized technique of multiple regression, they presented the total, direct, and indirect effect of sets of independent variables on husbands' "housekeeping role sharing." It should be noted that one limitation discussed earlier applies here: this study measured husbands' role participation by asking the one question about who does the housekeeping with the typical five response categories. Obviously, this raises questions about the precision of the actual dependent variable used, especially since 92 percent of the wives reported that they themselves completed all or most of the household production tasks. Significant positive associations were found between husbands' housekeeping role participation and wives' education, wives' market work time, and wives' housekeeping expectations, while negative effects of husbands' education and income on husbands' role participation were reported. Although the total relationship between husbands' work time and their housekeeping role performance was not significant, they maintained that work time did slightly decrease their role performance via indirect effects through husbands' income.

Increases in husbands' income directly reduced their sharing of the housekeeping role and indirectly reduced it by diminishing wives' work time and housekeeping role expectations for husbands. (Clark et al., 1978, p. 15)

They explained the income effect as increasing the husbands' resource power, which they exercised by spending less time in housekeeping, what husbands view as relatively unrewarding activity.

Their analysis of role expectations, role behavior and competence in role behavior is particularly interesting. While husbands' work time had no relationship with either role performance or role competence, wives' expectations (again only measured by one "should" question) for role performance were positively related to husbands' housekeeping role sharing and negatively related to wives' perceptions of husbands' competence in the housekeeping role. As Clark et al. (1976) maintained:

This may be critical for understanding the effects of husbands' work time on marital role competence. . . . Among wives who felt that they should do most of the housekeeping, the correlation between husbands' work time and housekeeping role competence was positive. . . . However, among wives who expected their husbands to share equally in housekeeping, the relationship was negative. (p. 16)

Spouses' expectations concerning role performance affected not only husbands' role behavior but their perceived competence at completing household tasks.

A final groundbreaking study in the sociological literature is Farkas' (1976) test of three competing hypotheses relating couples' division of labor in the home to their absolute educational levels, their relative level of education, and their relative wage rates. The three hypotheses he termed, respectively, (1) the "subcultural" hypothesis, related to absolute levels of education, socialization, and tastes (Gans, 1962); (2) the "relative resources" hypothesis,

which focuses on the relative educational levels of couples (Blood & Wolfe, 1960; Bahr, 1972); and (3) the "economic" hypothesis (Becker, 1965), which maintains that "couples strive for efficient time allocation and arrange their activities in response to a comparison of the wage rates commanded by each" (Farkas, 1976, p. 473).

Using panel data from the Panel Study of Income Dynamics, Farkas (1976) employed multiple regression to analyze the amount of time wives spent in market work and husbands spent in household work, as well as the five-year frequency with which the spouses shared market work and household work. To avoid the problem of missing wage rates for wives, he analyzed data only for those couples in which both spouses worked during the base year, 1967. The numerous independent variables entered included the ratio of husbands' and wives' wages, dummy variables representing various combinations of husbands' and wives' education, race, number and age of children, religion, felt need for additional income, number of rooms in house, local labor market conditions, and whether or not it was the head's first marriage. In addition, he utilized two sets of equations, one set of which included the lagged values of the dependent variables in each analysis. For example, in the equation predicting wives' hours of market work in 1972, he entered the variables of wives' hours of market work in each year from 1968 to 1971 as independent variables. He also ran separate regressions for younger (wives under 35) couples and older couples.

Farkas found some support for what he termed the relative wage hypothesis in the regressions for wives' hours of market work

(negative relationship) and for older families in the regression for the composite measure of years of role sharing (negative relationship), but not in the analysis of husbands' hours of housework. While the effects were significant in the expected direction (i.e., increase in the ratio of husbands' wages to wives' wages associated with a decrease in wives' market work and in the percentage of years of role-sharing), they were quantitatively small. The partial effects of the absolute level of education on wives' hours of market work, husbands' hours of housework, and years of role-sharing were both significant and quantitatively larger. The presence and age of children decreased wives' hours of market work, increased younger husbands' hours of housework, and decreased the percentage of years in which husbands and wives shared roles.

Farkas (1976) summarized the relationships found in the analysis he considered the most useful: "the five year propensity of husband and wife to share tasks . . . is just barely responsive to Wage Ratio, more strongly influenced by children, and most strongly influenced by educational level" (p. 482). While predictions of both the subcultural and economic hypothesis were confirmed, neither was sufficient by itself to explain the spouses' division of labor in both labor market and household work. Moreover, differing results occurred when the different dependent variables, wives' labor force hours, husbands' housework hours, and role-sharing by spouses, were analyzed. As a preliminary attempt to test alternate explanations of family time allocation, this study is a notable improvement over previous work. However, the lack of theoretical development of the hypotheses and

the peculiarities of the data set (the panel study design, in particular), plus some of the technical methods employed, make the study less a fulfillment of its purported purposes than is claimed.

To summarize, while there is a long history of sociological inquiry into spousal role division in the market and home, until recently few conceptually based and methodologically sound studies have been done. Pathbreaking attempts (Richmond, 1976; Farkas, 1976; Clark et al., 1978) have been made recently to conceptually integrate sociological and economic theory and to utilize more sophisticated methodology and statistical techniques to analyze the dynamics of family role behavior and division of labor. These studies, using as a conceptual framework the body of knowledge on role expectations and behavior, resource theory, and economic theory, albeit in a limited way, have investigated the effects of both economic and sociological variables on household division of labor. Significant effects of socio-demographic factors such as age of spouses, number and ages of children, and sex-role expectations or attitudes have been reported, as have significant effects of market work hours, wage rates, income, and education (as a proxy for both productivity and tastes). Any conclusions, however, about the superiority of either body of theory is unwarranted based on preliminary evidence. As Farkas (1976) concluded: "Further work on the determinants of the extent to which husbands and wives coordinate their activities is called for" (p. 483).

Defining and Measuring Household Production

Discussions of household production have ranged from armchair commentaries on what constitutes work and leisure to complex derivations of models of home production similar to market-based production functions. In one of the earliest discussions, Reid (1934) defined household production as unpaid activities, completed by and for family members, which could be replaced by market goods and/or paid services if circumstances such as income, market conditions and personal inclinations encouraged and permitted delegating them to persons outside the family.

For several decades, however, economists ignored the distinctions between components of non-market time now commonly analyzed separately --namely, household production and leisure. Two activities, consumption, representing all non-market time, and production, representing market work time, continued to dominate the discussion of the dichotomous "labor-leisure" choice. Overlooked entirely was the process of household production that transformed market-produced goods and services into commodities to be consumed by the family.

The household production function is now an established part of theory as formulated by Becker (1965) and others. Becker was not the first economist to recognize omissions in former theory; Rosenstein-Roden (1934) had introduced the concept of the importance of time inputs into the process of maximizing consumers' satisfaction. However, Becker's contributions were, indeed, a pioneering effort in the definition of the components of time allocation. According to this approach, market goods and services are combined with time inputs to

produce home commodities which maximize utility subject to time and income constraints. However, even the early formulations of this theory did not distinguish between time in work at home and leisure. As Gronau (1977) indicated, several reasons exist for omitting this distinction:

This omission was partly due to practical difficulties in distinguishing between the two, given the large number of borderline cases (e.g., is play with a child leisure or work at home?), but partly because it has not been shown that our understanding of household behavior would be enriched by the distinction. (p. 1100)

As a result, the early theoretical formulations, although they recognized the importance of time inputs into household production, did not really deal with household production time separately from leisure.

Gronau (1977) gave two suspect justifications for a failure to distinguish between home production and leisure: (1) if time allocation to each reacts similarly to changes in the socioeconomic environment, and (2) if the relative price of each activity is constant, then they satisfy the conditions of a composite input; thus, no gains from studying them separately can be attained. Both assumptions, Gronau maintained, are incorrect in that recent studies have shown that time in home production and leisure are separate components that have varying relationships with different socioeconomic factors, including wage rates, which indicates that their shadow prices are different.

Once the proposition is accepted that time in household production and leisure are different inputs, the difficult task remaining is distinguishing between activities that should be considered work

at home and leisure. The provision of nourishment can range anywhere from providing food available in the refrigerator or shelves, to a take-home restaurant meal placed on the table, to a simple meal served, to a gourmet meal served with all the accouterments. At what point on this continuum is this food preparation considered household production and at what point is it leisure? Sociologists and home economists have tended to define household work according to some requirement of obligation or discretion. Leisure is discretionary time; household work is everything else. However, obligation and choice have never been precisely defined and the discretionary time involved in performing an activity at a higher standard (i.e., to serve a gourmet meal instead of having food available in the refrigerator) would not be classified as work. Clearly, some other criterion than an obligation-discretion continuum (which, incidentally, has never been used in the market) must be employed.

Economists have used as that criterion the output from the time inputs as a measure of whether an activity is household work or leisure. Gronau (1976) defined household work as "those time inputs that serve to produce some intermediate commodities, while leisure is time that generates utility by itself" (p. 208). Hawrylshyn (1977) defined it as "non-market activities which produce goods and services for the members of the household not desired in and of themselves, but rather for the utility which they yield" (p. 89). Walker and Woods' (1976) definition of household production is those "purposeful activities in individual households to create the goods and services that make it possible for a family to function as a family" (p. XX). Implied in

these definitions is the fact that the provision of these goods and services which are produced via household production may conceivably be produced in the market and by the fact that they produce only indirect utility for the individual or household.

Furthermore, Hawrylyshyn (1977) suggested the following more practical criterion for defining household production: "An economic service (or Z activity) is one which may be done by someone other than the person benefiting therefrom" (p. 87). Clearly, household and/or market substitutes exist for producing such household commodities as clean floors, meals or even child care, while no one else can provide "leisure" for an individual but that individual. As

Hawrylyshyn (1977) continued:

Child care values must exclude the satisfactions of developing an effective human being, but may include the teaching of accepted social mores; spouses' services should include the meals and clean shirts, but exclude personal affection and companionship. To respond immediately to the inevitable jokes about market replaceability for conjugal relations, let it be said that of course one can find a market alternative price for sex in dollar terms, but this has little relation to, and does not change the fact that the price of love is, well, love. (p. 87)

Still a problem is the idea of joint production occurring during a single time input period. Pollak and Wachter (1975) and Hawrylyshyn (1977) contend that two problems associated with joint production of basic commodities are pervasive and confound the accurate measurement of household production time. First, both direct as well as indirect utility is derived from a single household production activity and, secondly, more than one household activity can be completed during a single unit of time. As Hawrylyshyn (1977) explained:

Thus, the stove is used to produce nutrition and gourmet pleasures, the house provides shelter, rest, and recreation and the car provides both transport and status. Even more significant is the jointness in the time input used to produce commodities, a phenomenon reflected in the ubiquitous plaint of mothers who can't but must do ten things at one time. (p. 84)

The first problem mentioned regarding joint production is serious when attempting to predict demand for basic commodities or Z's because marginal costs of production of any one commodity cannot be uniquely determined. However, in the analysis of the allocation of time inputs, the problem is less theoretical than empirical. An hour of time is still valued at its shadow price or the opportunity costs of other time uses, usually (imperfectly) measured by the market wage of the individual. But as Hawrylyshyn (1977) maintained, "we must be careful in defining time inputs when joint production occurs" (p. 84). Careful definition and measurement of activities according to the purpose of the activity, as used in the present study, may be utilized to overcome this problem and distinguish between nebulous activities.

The second problem of joint production, the performance of multiple activities during one unit of time, is somewhat ameliorated by Walker's (1976) use of the designation of primary and secondary time use, which permits the measurement of more than one activity at a time. Primary activity is defined as the activity to which the individual is devoting his/her main attention, physical and/or mental, while secondary activity is an activity during a time period in which a person is engaged in another primary activity to which a person is giving his/her primary attention. Only primary time use for household

production and travel time related to household production activities, i.e., driving to the grocery store for shopping, are included in most research of time use, including the current study. Analysis of secondary time use, although not attempted here, would shed light on the incidence and importance of joint production in household work.

A final issue concerning the measurement of household production has generally been successfully confronted by most recent studies. Before precise theoretically based definitions of the activities constituting home production were developed, researchers most often simply measured time spent in a laundry list of activities commonly considered "housework." Commonly included were those tasks traditionally completed by women; husbands' true contributions to household welfare were underestimated since the activities in which they usually engaged, such as yard work, home maintenance and car care, were not reported. Some studies (Nickols, 1976; Hunt & Kiker, 1978) still employ relatively limited definitions and measurements of home production; however, most recent studies, including the present one, use more comprehensive definitions of the activities to be included in a measure of household production in an effort to attain a more valid measure of the true contributions of both wives and husbands to the welfare of the family.

Empirical Time Use Studies

Descriptive Studies

The study of time allocation to non-market production is relatively new with the exception of the U.S. Bureau of Home Economics

"work unit" studies which date back to the 1920's. The primary focus of those studies was a description of time spent in various household tasks by homemakers. Even now, after several serious attempts since the mid-1960's to analyze family time inputs into household production, relatively little attention has been given to the inputs of males into household work. Many of the early studies (Cowles & Dietz, 1956; Wilson, 1929; Warren, 1940; Weigand, 1953, 1954; Hall & Schroeder, 1970) did not even report time in housework by husbands. Even more recent studies (Leibowitz, 1974; Gronau, 1973; Gramm, 1974; Cochrane & Logan, 1977) have focused solely on time inputs by wives into household production. The focus of this review will be on those studies which have investigated husbands' time in household work. Of particular importance is the fact that each study employed a different operational definition of household work, ranging from traditional narrow definitions of housework to broad measures of household production which include all productive activity not paid for in the labor market.

Manning (1968), using data from daily time records of 111 Indiana families in 1961-1962, analyzed time inputs into fifteen household tasks, including meal preparation, dishwashing, packing lunches, special food preparation, food preservation, regular house care, special house care, house upkeep, washing, ironing, sewing and mending, care of children, care of adults, financial planning and record-keeping and marketing activities. She reported that ninety percent of all time spent in household production, relatively broadly defined, was spent by homemakers; family "helpers," mainly husbands and

children, spent time primarily in dishwashing, meal preparation, and regular house care. All household helpers (anyone other than the homemaker) spent an average of 5.4 hours per week on all household tasks.

Vanek (1974), using data from daily time diaries from the national sample of the Survey Research Center study in 1965, primarily analyzed the time spent in housework by employed and non-employed women. Tasks included in that study were food preparation, home care, clothing and linen care, family care, and shopping and managerial tasks. She reported that,

Contrary to popular belief, American husbands do not share the responsibilities of household work. They spend only a few hours a week at it, and most of what they do is shopping. (p. 118)

She found, further, that it made no difference whether or not the wife was employed; husbands of employed women spent no more time in household production than did husbands of full-time homemakers. She concluded that over time, in comparisons of her data with historical time use data, there continued to exist "an imbalance in the economic roles of husband and wife" (Vanek, 1974, p. 119).

Walker (1970) found similar results for husbands in her study of time inputs for household work of 1,296 husband-wife families in the Syracuse, New York area in 1967-1968. Time inputs into household production were broadly defined to include all household work plus activities not traditionally defined as housework, such as care of the outside of the house, the yard, the car, and pets. Husbands' time use for all household production averaged 1.6 hours (96 minutes) per

day, whether or not their wives were employed. As Walker (1970) explained:

The husbands contributed about the same amount of time on the average, when their wives were full-time homemakers as when they were gainfully employed either part time or 30 or more hours a week. (p. 1)

Husbands' time inputs varied somewhat according to the type of household activity. Husbands spent the most time on house care, defined to include care of the inside and outside of the house plus car care, an average of 36 minutes per day. Time inputs by husbands into house care were unaffected by wives' hours of employment.

Husbands, on the average, contributed about 24 minutes per day toward both family care and the cluster of marketing, management, and record-keeping activities. For both activities, husbands' inputs were constant whether or not the wives were employed. Family care time inputs by husbands were more often non-physical care activities, such as helping with homework and providing older children with transportation to meetings, rather than physical care of children.

On the average, husbands spent nine minutes per day in food preparation and clean-up activities; this again did not vary according to the wives' employment status. Husbands spent an average of less than six minutes per day on clothing care, whether or not the wives were employed. As Walker (1970) summarized:

The study indicates that wives continue to do most of the in-the-home work and husbands continue to do yard work, home maintenance, help with marketing, record-keeping, and socializing types of activities with children. (p. 2)

As for the relationship between husbands' time inputs into household production and family composition variables, Walker (1970) found:

(1) that husbands' household work time varied somewhat with the number of children present, but inconsistencies in the pattern of variation prevented complete explanation of the variability. Generally, however, husbands' time inputs increased as the number of children present in the home was higher.

(2) that husbands' time inputs varied with the age of the youngest child, particularly if wives with a very young child worked over 15 hours per week in the labor market. Husbands of employed wives with the youngest child one year old or younger spent more time in household work than did other husbands.

(3) that husbands' household work time varied somewhat with the age of the wife and her employment status if no children were present. Husbands of employed homemakers under 40 spent more time (about 1½ hours) in housework than did husbands of non-employed homemakers under 40 (about one hour). In addition, husbands of over-40-year-old homemakers who were employed spent less time in housework than did husbands of older full-time homemakers. (Pp. 2-3)

Each of the preceding studies cited employed a diary or recall method of measuring time use for household production that made them roughly comparable. Several other studies, using different and less precise methods for estimating or measuring time use, generally confirm the finding that husbands spend relatively little time in household work. Morgan, Sirageldin and Baerwaldt (1966) in their national study of the productive activity of households used yearly recall estimates and reported that husbands contributed an average of four hours per week or about 35 minutes per day in housework, which in that study was rather narrowly defined. Oakley (1974) in her study of London families found that relatively few husbands contributed

any time at all to household work. A small minority of husbands assisted with child care and house care. Stratifying families by social class, Oakley (1974) found that husbands from middle-class households contributed more time to household work than did working-class husbands. Using a relatively comprehensive definition, Hunt and Kiker (1978) surveyed approximately 400 South Carolina households and reported that husbands spent about 11 hours per week in all household work. Most of that time was spent in child care and "other" household production, which probably included those activities not defined in the traditional activities called housework.

Evidence from international studies shows similar patterns of household production by husbands. Szalai (1972) reported on time use studies conducted in a variety of European countries in both rural and urban areas within each of approximately 14 countries. Although the methodology was different in the study reported from each country, it was similar enough to permit comparison across countries. He reported:

Despite the wide cultural diversity across our samples, the expected sex role differences do turn up in very marked form at all sites. This is not to say that employed men make no contribution to household demands. On days off from work they do turn considerable attention to household care activities of non-food shopping and running other errands, as well as engaging in home repairs and other activities, so that averaged out across a week they end up committing . . . about three-quarters of an hour per day. (Szalai, 1972, p. 124)

He reports that husbands' time inputs to those activities traditionally defined as housework also doubles on their days off from work compared to weekdays with much of the increase occurring via greater time inputs to housecleaning. However, husbands' overall

contributions to the core housework activities, averaged across the week, are scarcely more than a half hour a day or about 3.5 hours per week (Szalai, 1972). He maintains that the data from the various European countries separates time use into a core of housework, still primarily completed by women and other household production activities which are either male-stereotyped or less clear in their sexual connotation. He concluded:

The major portion of their (husbands') contribution remains with the more peripheral household care activities and women in the household, whether employed or unemployed, shoulder almost all of the housework burden. (Szalai, 1972, p. 124)

Predictive Studies

Several recent studies have investigated factors affecting husbands' use of time for household production, although even in these studies the primary focus of the research was wives' household production. Each study employed different operational definitions of household production and different measurement techniques. Comparisons across studies are limited by the differences in the nature of the dependent variable(s) used and in the degree of detail and accuracy of the explanatory variables. Table 1 summarizes the results of five studies that have used multivariate methods to analyze husbands' time inputs into home production.

Bloch (1973) used data from the 1964 Productive Americans study (Morgan et al., 1964) in which a national sample of respondents gave yearly recall estimates of time spent in regular and irregular household work, which produces a dependent variable with fairly extreme

Table 1
Findings of Previous Studies on Determinants of
Time Allocation of Men to Household Production

VARIABLE	BLOCH (1973)	GRONAU (1976)	NICKOLS (1978)	HUNT & KIKER (1978)	SANIK ⁶ (1979)
H's hours of market work			-		-
Husband's wage rate	-		-	- ³	
Husband's age		0		- ⁴	
Husband's education		0	-	+ ⁴	
Wife's hours of market work			+		0
Wife's wage rate	+		+	0 ³	
Wife's age				0 ⁴	
Wife's education		+		0 ⁴	0
Non-earned income	0			+	
Family size/no. children	+ ¹		-	0 ⁵	
Presence of preschool children	+ ¹	+ ²		0 ⁵	
Age of youngest child					0
Age of oldest child					0
Capital equipment				0	
Decade effect					+
	R^2	.04	.07		.12

NOTES

- ¹ The regression effects depended on the functional form of the regression equations.
- ² The regression coefficient was barely significant.
- ³ Wages were entered into the equation as the predicted natural log of the spouses' wages ($\ln W_1$, $\ln W_2$).
- ⁴ These variables are principle component variables representing the quantity and quality of child care services demanded.
- ⁵ Age and education were transformed by orthogonal principle component factor analysis to form a variable human capital endowment. The correlations between the variables and the factor reveals the direction of the relationships when considered separately.
- ⁶ Sanik performed covariate analysis prior to ANOVAs, testing for decade effects between 1967 and 1977.

measurement error. The independent variables entered into ordinary least squares regression equations for home production, market work, and leisure included husbands' wage rate, wives' wage rate, nonwage income, total number of children, and the existence of preschool children. The effect of husbands' wage on their household production time was negative; an increase in the wage rate decreased husbands' household production time. An increase in the wives' market wage rate increased husbands' time in home production and decreased husbands' leisure time; wives' wage and husbands' market work hours were not related. The relationship between non-earned income and husbands' time in home production was not significant.

Both the total number of children and the existence of preschool children were positively related to husbands' time in home production, although these effects differed according to the functional form of the equation estimated. Each of these variables was also associated with an increase in husbands' market work time and an accompanying decrease in husbands' leisure.

Gronau (1976) used data from an Israeli survey conducted by the Israeli Institute of Applied Social Research. Daily estimates, using data collected via recall methods, were reported for market work, household work, leisure, and physiological needs using a fairly comprehensive definition of household production. However, only limited information on respondents' socio-demographic characteristics was available. Husbands' time use was regressed on husbands' and wives' education, husbands' age, the presence and number of preschool-aged children, country of birth, and date of immigration. Although

husbands' age and education had no significant effect on husbands' household work time, wives' education was positively related to husbands' time in home production. As Gronau (1976) maintained, "it is the effect of wife's education which overcomes the educated husband's aversion to housework and increases his willingness to help with child care" (p. S218). The effect of the presence of preschool-aged children was positive on husbands' household production time; the presence of a preschooler increased time spent by husbands by about a half hour a day. Gronau (1976) summarized that the socioeconomic factors included in his study explained much less of the variability of men's household work time than that of women, a finding that concurs with other studies that have examined the time use of both.

Nichols and Metzen (1978) used data from the 1974 wave of the Panel Study of Income Dynamics on the time allocation of 1156 structurally intact families in which the spouses are able-bodied and under 65 years of age. The data on time inputs for household work were collected by yearly recall methods according to a relatively restricted definition of household production which included only cleaning, meal preparation and clean-up, laundry, and financial record-keeping. They regressed both husbands' and wives' time inputs into household work on clusters of independent variables selected according to the following criteria: (1) those measuring pressures toward greater time inputs to housework, i.e., family size and composition, (2) those constraints on time inputs to household work, i.e., time inputs into labor market employment, and (3) those facilitators of household production, i.e., the presence of capital goods and house size.

After preliminary regressions were run, the final regression equation for husbands' time inputs included seven independent variables, listed here in the order of their stepwise inclusion: wife's average hourly earnings, husband's annual labor force hours, family size, wife's annual labor force hours, husband's education, husband's average hourly earnings, and wife's occupation. The estimated regression equation explained 7.4 percent of the variability in husbands' housework hours; the first six independent variables were statistically significant. Wife's average hourly earnings, wife's annual hours of labor market work, and husband's education were positively related to husband's time inputs to housework, whereas husband's annual labor force hours, family size, and husband's average hourly earnings were negatively related to husband's time spent for housework. Although a relatively small amount of variability was explained by the regression, they explained that the narrow definition of housework, which caused relatively small absolute time inputs by husbands and low variance, contributed to the low level of explanation achieved.

Hunt and Kiker (1978) used data from a 1978 cross-sectional sample of South Carolina households surveyed by the Division of Research at the University of South Carolina. Relatively complete estimates of time use in meal preparation, shopping, laundry work, housecleaning, child care and miscellaneous home chores were gathered. However, two techniques they used make their results less than strictly comparable to those of other studies. First, the wage variables were entered into the equation as natural logs because the researchers

expected a curvilinear relationship between those variables and husbands' time inputs into household production. Secondly, severe multicollinearity among the independent variables necessitated the use of principle component factor analysis to produce surrogates for certain variables in the empirical estimation of the model. Age and education of both husbands and wives were factor analyzed separately to produce a variable called human capital endowment for each spouse. In addition, two measures representing the quantity and quality of children were factor analyzed to produce two variables representing the quantity and quality of child care services desired. Because factor scores for these variables, especially the human capital variables, are differentially (negatively to some and positively to some) related to the original variables, clear cut interpretation of the final relationship is difficult.

Husbands' time inputs into household production were negatively related to their wage rates and positively related to nonwage income. Hunt and Kiker (1978) interpreted this as the action of the expected negative substitution or wage effect and a positive income effect. The remaining significant relationship was found between husbands' time in household work and husbands' human capital endowment. Relating this back to the factor loadings for husbands' age and education in the principle component analysis, this can be tentatively interpreted as representing a positive effect of education and a negative effect of age; that is, younger husbands with higher levels of educational attainment provided more time for household production. The positive education effect was the stronger influence on the

relationships as reflected by its higher factor loading in the factor analysis. None of the other independent variables entered, wives' wage rate, wives' human capital endowment, representing their age and education, or the principle component variables representing quantity/quality of child services was significantly related to husbands' housework time.

Sanik (1979), using the 1977 New York data from the same project of which the present data are a part, employed analysis of variance with covariance to analyze the differences between husbands' time inputs to household production in 1967-1968 and 1977. Data from 210 urban and rural New Yorkers were gathered using a comprehensive definition of household production and using the combined daily recall and diary methods employed here. In covariance analysis, the regression coefficients associated with the variables entered as covariates can be interpreted identically to the b-values in ordinary least squares regression analysis. There was a significant but small positive relationship between decade and husbands' household production time; husbands spent an average of 1.7 hours per day in household work in 1967 and about 2.2 hours per day in 1977, a difference of about 30 minutes per day, even when all covariates were controlled. The only significant (but again absolutely small) relationship between the dependent variable and the covariates was between husbands' hours of labor market employment and their household production time. For every one hour increase in market work, husbands spent an average of about two minutes less per day in household work. As Sanik (1979) reported, "Thus, the spouse who was employed 40 hours per week would

spend, on the average, .7 hours per day more in all household work than the spouse who was employed 60 hours per week" (p. 74). None of the other covariates, wife's hours of market work, wife's education, age of youngest child, or age of older child, was significantly related to husbands' contributions to household production.

One final study, Leibowitz's (1974), even though she did not investigate husbands' time in household work per se, is noteworthy because she entered husbands' time inputs into housework in regression equations designed to explain the variability in wives' time use for various activities of home production. So, even though determinants of husbands' time were not investigated, some of her findings on the substitutability and complementarity between husbands' and wives' time inputs into household work are relevant. Wives' time inputs for four household production activities, including meal preparation, laundry work, physical child care and other child care, were regressed on three types of variables which she hypothesized would increase the marginal productivity of time use in the home: (1) factors affecting productivity, such as wife's age and education, (2) measures of substitutes, such as the presence of capital goods and time inputs by persons other than family members, and (3) demand factors, such as family income and the number and age of children.

Husbands' time inputs to meal preparation averaged about 11 minutes per day and were significantly related to wives' time in meal preparation.

For each ten minutes devoted to meal preparation by the husband, the wife reduces her input to this task by five minutes--suggesting that husband's time in meal preparation is a substitute (albeit a highly imperfect one!) for the wife's time. (Leibowitz, 1974, p. 246)

While husbands' time in meal preparation served as a substitute for wives' time, the opposite was true for physical care of family members (primarily child care), in which husbands' time inputs were complementary to those of wives:

The significant positive coefficient on husbands' time inputs indicates that, for each ten minutes the husband spends in physical care, the wife puts in an additional four minutes. This is not merely an indication of the family's tastes (since these are controlled for by the "preference" variable), but may indicate true complementarity--increased inputs of husband's time increasing the marginal productivity of the wife's time inputs. (Leibowitz, 1974, p. 247)

Husbands' time inputs to other family care, including time spent in social and educational activities with children, averaged between 15 and 20 minutes per day and were significantly positively related to wives' inputs into other family care. In regressions run for subjects grouped by wives' education, Leibowitz also found that time inputs into physical child care by husbands with highly educated wives were more complementary than were the inputs of husbands of wives with lower levels of education.

Summary

To summarize this review of literature, the following conclusions are presented. First, although varying operational definitions of household production abound, consensus exists that the following conditions must be met for an activity to be classified as household production. It must be a non-market activity, completed by a household member or other person without pay, which results in the creation of intermediate commodities which create utility for one or more

family member. It also may be done by someone other than the benefiting person. The distinction between primary and secondary time somewhat overcomes the problem of joint production of time use.

Secondly, empirical analysts, both economic and sociological, agree that wives still complete most of the activities of home production and husbands spend relatively little time in household work, however it is measured. Estimates of husbands' contributions to household work have ranged from 3.5 hours to 11.2 hours per week, depending on the definition and measurement procedure used.

Thirdly, economists maintain that the allocation of time by family members depends on the relative wage rates of spouses, as they reflect the productivity of spouses at market and household work. Generally excluded from their models are "taste" variables, which are assumed both to be invariate across households and constant over time. Sociologists maintain that a household's division of labor is primarily related to individuals' role expectations, although recently some studies have incorporated economic variables such as wage rates and family income into the models employed.

Finally, empirical studies have, indeed, found some support for the economic hypothesis; negative wage effects and positive income effects on husbands' household work time have been found (Bloch, 1973; Hunt & Kiker, 1978; Nickols & Metzen, 1978). Husband's education (Hunt & Kiker, 1978) and wife's education (Gronau, 1976) have both been found to be positively related to husband's time in home production, although it is not clear whether these effects represent spouses' productivity or their tastes. The number of children and

presence of preschool children (Bloch, 1973; Gronau, 1976), representing the demand for home-produced commodities, are positively related to home production time of husbands, although Nichols and Metzen (1978) found a negative relationship between family size and husband's housework hours. They speculated that husbands in larger families spent time in household production activities not included in their relatively restricted measure of household work (Nickols & Metzen, 1978). Those models which have reported the relevant results have done a fairly poor job of explaining the variability in husbands' hours of household production; whether this is because of measurement error which creates "noise" in the dependent variables or because of the exclusion of relevant independent variables is indeterminant. However, clearly more work is needed to determine the factors that influence husbands' time inputs into household production.

CHAPTER III

THEORY

The role of time inputs in the household production process is now an established part of the theory of the "new" economics of the family. As formulated by Becker (1965), the theory of time allocation maintains that households combine market goods and services and their own inputs of time to produce more basic utility-creating commodities. This approach, with its emphasis on utility-maximizing behavior, subject to constraints, has been incorporated into economic analyses of many aspects of human behavior not formerly studied by economists--fertility, marriage and mate selection, health, and crime and punishment (Becker, 1976).

However, this study asserts that economic explanations, while they are more theoretically developed than those of other disciplines, explain only part of the phenomenon of family time allocation. Also important are social, psychological, and situational factors, often more subtle and more difficultly measured, which affect family members' time allocation. The following model, developed by the author and based on Becker's (1965) work and modifications by Hunt and Kiker (1978), Gronau (1977), and Hawrylyshyn (1977), attempts to present an interdisciplinary explanation of the time allocation of families.

The Economic Model

The basic economic model assumes that households seek to maximize their utility by combining market goods and services and their own time inputs to produce more basic commodities. Modern economists define utility based on the observed phenomena of choice between two or more alternatives. As Hirshleifer (1976) explained:

The statement "Basket A is preferred to Basket B" and "Basket A has higher utility than Basket B" are equivalent. They both lead to the empirical prediction: "Basket A will be chosen over Basket B." Conclusion: Utility is the variable whose relative magnitude indicates strength of preference: In finding the most preferred position, the individual maximizes utility. (p. 58)

Traditional theory of individuals' and families' economic behavior maintains that utility of the household is a function of the quantities of market goods and services consumed, plus the family members' leisure.

Here, the utility function of the family is defined as:

$$U = f (Z, L_h, L_w)$$

where

Z = A vector of "basic" commodities produced by the family

L_h = Time in pure leisure of husbands

L_w = Time in pure leisure of wives.

The utility function states that family utility is a function of a vector of basic commodities (Z) and the quantity of husbands' and wives' time in leisure. For simplicity, the only satisfying use of time is assumed to be leisure. No utility is derived from market work or household production per se. As Gronau (1976) explained, "A person

is ready to shift time from leisure to work at home not because work generates utility directly but because it is a necessary input in the production of the commodity Z , where Z is the source of utility" (p. S203).

A basic good Z_i is produced according to the following household production function:

$$Z_i = f (X, H_h, H_w, A_h, A_w, E_h, E_w, \bar{K})$$

where

Z_i = A home-produced basic commodity

X = A vector of market-produced goods and services

H_h = Time in household production of husbands

H_w = Time in household production of wives

A_i = Age of spouse i

E_i = Educational level of spouse i

K = An endowment of capital goods, e.g., appliances.

The commodities represented by Z are a vector of basic commodities produced by combining market goods and services and family members' time inputs, such as a home-cooked meal, which requires market goods (X), such as raw food, utensils, and appliances, and inputs of time to produce. The age and education of the spouses are factors which may affect the productivity of the spouses' time inputs into the production process. K is a parameter representing the technology available for the home production process, which should also affect the productivity of the transformation of goods into basic commodities. Here, because of the geographic proximity of the sample, the technology available to families can be assumed to be equal and need not be

considered. Choices about capital equipment by families are clearly endogenous. Spouses' age and education are assumed to affect their productivity in household production, as well as in market production.

As Becker (1976) noted, conceptual and empirical advantages accompany the assumption that time and market goods are combined to produce commodities, instead of assuming that the amount of market goods consumed determines the allocation of time: "For example, a change in the cost of goods relative to time could cause a significant substitution away from the one rising in relative cost" (p. 91). An increase in the opportunity cost of time relative to market goods and services could produce a shift away from time-intensive non-market activities to goods-intensive ones and vice versa.

The household maximizes its utility subject to two sets of constraints, a budget or income constraint:

$$Y \equiv X P_X = W_h M_h + W_w M_w + I$$

where

Y = Total family income

X = A vector of market goods and services

P_X = Prices of market goods and services

W_i = Wage rate of spouse i

M_i = Time in market work of spouse i

I = Non-earnings income

and two time constraints, one for each spouse:

$$T_i = L_i + H_i + M_i$$

where

T_i = Total time available to spouse i

L_i = Time in leisure of spouse i

H_i = Time in household production of adult i

M_i = Time in market work of adult i.

Using partial equilibrium analysis, Hunt and Kiker (1978) derived the conditions for the maximization of utility of the family. These suggest that the marginal product of work at home (the marginal rate of substitution between market goods and household production) is equal to the marginal rate of substitution between goods and leisure, which in turn is equal to the shadow price of time, the opportunity cost of foregone uses of time, measured here by the individual's wage rate. Thus, the "price" of time in home production is the market wage rate. They also suggest that the price ratio of time inputs equals the ratio of the marginal productivity of the inputs. This implies that the individual with the higher wage rate, *ceteris paribus*, will spend less time in home production. As Gronau (1976) explained, "If, on the average, men tend to get a higher wage rate than women . . . families may find it cheaper to produce the home commodities using relatively more of the housewife's time than the husband's" (p. S203).

Simplified, the previous discussion suggests that the relative marginal productivity of husbands and wives in both labor market work and household production determine the time allocation arrangements of the couple. An increase in the wage rate of one spouse raises the price of his/her household production because of the increased

opportunity costs of forgone market work. This may induce substitution away from home production either by substituting market goods for time-intensive commodities or by substituting the home production time of family members with relatively higher marginal productivity at home production (or relatively lower marginal productivity in labor market work).

The economic theory maintains that these relationships hold when individuals' tastes and other measures of individuals' productivity are held constant. Economists typically abandon the problem of tastes to other disciplines whose scholars concentrate on them. Indeed, Stigler and Becker (1977) argued that "de gustibus non est disputandum" (tastes are not disputable), because:

tastes neither change capriciously nor differ importantly between people One does not argue over tastes for the same reason that one does not argue over the Rocky Mountains--both are there, will be there next year, too, and are the same to all men. (p. 76)

They maintain that most changes attributed to non-economic factors, such as tastes, can be instead attributed to stable preferences, if individuals' choices about their investment in specific skills, based on their prices, are considered.

Rather than including measures of tastes in models, they maintain that ceteris paribus conditions can be maintained by searching for more subtle forms of prices and incomes to explain differences among individuals. Habits, attitudes and customs result, in their view, from the "investment of time and other resources in the accumulation of knowledge about the environment and of skills with which to cope with it" (Stigler & Becker, 1977, p. 82). Basic to this view is the

heroic assumption that there is an economic explanation for all human behavior in all of its subtle forms.

This is clearly a case where the assumptions of ceteris paribus prevents an interdisciplinary analysis of the problem. As Fisher and Ando (1970) lamented, "the variables taken as given by one discipline are the very subject matter of another and vice versa" (p. 70). To exclude or assume away functional relationships for the sake of a neat, albeit narrow, analysis ignores the reality of the situation:

The very real problem is presented that if variables taken as given are causally affected by the variables of the system being analyzed or if variables assumed not to affect that system actually do affect it, the results of the analysis may have little relevance for the study of real problems. (Fisher & Ando, 1970, p. 70)

The models of economists which maintain that time allocation operates through the price mechanism of the labor market are a base from which to build, but common sense and sociological and social psychological theory suggest that an important part of reality is distorted needlessly or ignored. While not disagreeing that if one searches hard enough one may derive economic sources of differences in individuals' values, attitudes and motivations, this researcher maintains that an examination of such factors themselves is both useful and more realistic than examining their subtle forms observable via economic factors. Husbands and wives do bring values and attitudes as well as a variety of skills, knowledge and other resources to a marriage. Further, these sociological and psychological factors may differ significantly not only across individuals and couples but over time as they make interlocking decisions about labor force participation, children, spending and household work arrangements.

Economists typically argue that these variables are endogenous to the system and are simultaneously determined along with the time allocation of the spouse and/or the economic factors. However, a commonly accepted explanation of exogenous variables is that they are "either historically given, policy variables, or determined by some separate mechanism" (Intriligator, 1978, p. 28). Although any of the three situations may apply to sociological and psychological variables, tastes, the economists' term for social and psychological factors, here are assumed to operate independently of the price mechanism of market wage rates and incomes. Although they may be interrelated and themselves simultaneously determined, tastes and productivity are assumed to have no systematic interrelationships a priori. Neither direction of causation between productivity and tastes is assumed; rather, both factors are assumed to be exogenous to the time allocation decision.

As Bagozzi and Van Loo (1978) maintained:

When one looks deeper into the reasons why people do what they do, it becomes apparent that economic factors are only part of the study, and more subtle social and psychological forces interact with the economic ones as well as exert an independent influence of their own. (p. 215)

The argument that taste can be ignored is here abandoned in favor of a construct which attempts to integrate sociological and psychological explanations of time allocation behavior of family members and account for them in an analysis of time allocation.

Sociological and Socio-Psychological

Contributions to the Model

Instead of denying that individuals differ in their tastes--their values, attitudes, interests, and motivations to behave--or that economic variables such as wage rates and income are causally antecedent to such factors or that subtle forms of economic variables more accurately capture their effects, it is useful to examine the social and socio-psychological explanations of family time allocation behavior. Although these approaches were not developed to explain time use, per se, they have implications for such behavior by individuals acting within a family situation. Typically, such approaches having relevance to the present study range from structural-functional approach to social role behavior of Parsons and Bales (1955), and social exchange theory of Homans (1961), to more individualistic approaches focusing on attitudinal-behavioral consistency such as that of Fishbein (1963; 1967).

One approach by sociologists is based on the view that spousal division of labor is primarily influenced by norms, the constraining rules of society which imply overt or covert sanctions on behavior. This view generally traces its origin to anthropological and sociological studies of role differentiation and the Parsons and Bales' (1955) dichotomy of instrumental and expressive tasks, generally completed by males and females, respectively. Although discussions of norm-governed sex-role expectations and behavior are still pervasive, such approaches have been modified considerably from a dichotomous

classification. However, consistent evidence that activities are still relatively sex-specific (compared to androgynous role behavior, in which roles are transcended) implies that there are still societal norms governing "men's work" and "women's work" (Reiss, 1976, p. 25).

Inherent in this approach is the idea that differences in behavior attributable to sex do exist. Disagreement about the origin of these differences is ubiquitous; in fact, much recent work (Maccoby & Jacklin, 1974; Money & Ehrhardt, 1972) has focused on resolving the nature-nurture controversy of the "cause" of sex differences in behavior. Regardless of their origin, whether biologically or genetically determined, differences in role attitudes and expectations are widely believed to have a pervasive influence on the behavior of husbands and wives. Just as in the economic construct, where productivity in time use is functionally related to such human capital variables as age and education, causal antecedents such as the individual's education and social class and parents' education and income, are presumed to affect individuals' role behavior through their socialization as both children and adults. Most studies, however (Cf., Farkas, 1976), which purport to investigate differences in spousal division of labor resulting from differences in their socialization within certain cultures, utilize rather inadequate proxies, such as education alone, to capture these effects.

A related but different approach by other sociologists focuses on the social exchange theory of Homans (1961), which maintains that interpersonal interaction is governed by an evaluation by individuals of the costs and benefits, subjectively defined, of certain actions.

Husbands and wives are viewed as arranging their social relationship in such a way as to maximize their total profit. Not unlike the utility-maximizing model of economists, this theory differs from it, however, in that it focuses on a stimulus-response mechanism by which rewards and punishments reinforce individuals' behavior. The quid pro quo ("Something for something") arrangement of social exchange induces both spouses to incur costs of role specialization in order to receive other benefits.

Here it is assumed that husbands' and wives' attitudes toward marital behavior, i.e., their feelings about the expected benefits of an arrangement whereby one partner is dominant versus an equalitarian arrangement, oblige them to assume responsibility for tasks in return for economic, social, and psychic rewards. Role bargaining in which spouses, weighing the costs and benefits of various alternatives to arrive at a consensus on their time allocation, may occur. Rather than relying solely on productivity considerations, however, spouses are assumed to consider a wide range of subjectively defined costs and benefits--influenced by such factors as their likes and dislikes and their motivation to adhere to societal norms.

Another theory, resource theory, first developed by Blood and Wolfe (1960) and refined by Rodman (1967) as the theory of resources in a cultural context, closely parallels the utility and maximization hypothesis of the economists. They maintain that the relative resources of a couple (including such non-economic resources as physical attractiveness) determines their power in decision-making,

including the power to "decide" who allocates time to which activity. Typically, though, such resources as education and income have been used to empirically test this hypothesis. Less formally developed, this idea has received less rigorous theoretical attention than the similar hypothesis concerning the relative productivity of spouses, as measured by wage rates.

A final research tradition, primarily developed within the discipline of social psychology, but relevant to the present study, begins with the idea that attitudes are mental predispositions to behave. According to Allport's (1935) widely quoted definition, attitudes are a mental state of readiness to respond, organized through experiences, i.e., learned, which exert a direct influence on behavior. Innumerable studies have investigated the formation of individuals' attitudes, the multi-dimensional aspects of individuals' attitudes and the correlation between attitudes and behavior. In one of the more recent, widely cited formulated constructs of the relationship between attitudes and behavior, Fishbein (1972) proposed that

$$B \sim BI = \left[(A_{act}) \right] w_1 + \left[\sum_{i=1}^n (NB_i) (Mc_i) \right] w_2$$

where

B = Overt (observed) behavior

BI = Behavioral intention to perform

A_{act} = Attitude toward performing B

NB_i = Normative belief attributed to person i

Mc_i = Motivation to comply with expectations of person i
and

w_1 and w_2 are regression parameters.

Stated simply, an individual's behavior, approximately equal to his behavioral intention to act, is a function of his attitude toward performing that behavior and his normative belief concerning others' expectations, weighted by his motivation to comply with those expectations. With respect to family time allocation, an individual's time inputs into household production, for example, would depend on his/her attitude toward that behavior, i.e., toward household production tasks, and his/her belief about others' expectations concerning such role performance, weighted by his feelings about complying with those expectations.

While conceding that the proposed operational measures capturing the effects of socio-psychological factors, i.e., individuals' attitudes toward sex roles and their expressed interests in household production tasks, are much less precise than the theory proposes, it is, nevertheless, of interest to test hypotheses concerning these effects. Individuals' interests in household production tasks represent their attitude toward performing the overt behavior, i.e., time allocation to household work. Ceteris paribus, the more interested an individual is in a certain activity and the more he/she derives enjoyment from the task, the greater is the probability that individual will perform that activity. Note that, to some extent, this alters the economic proposition that all time inputs to household production are economic "bads" and the only utility-producing use of time is leisure. Individuals may derive direct utility from the performance of a certain household task; thus, one spouse may derive relatively more satisfaction from certain activities than the other spouse.

Husbands' and wives' attitudes toward sex roles are expected to operate as normative beliefs and motivation to comply with spouses' and societal expectations. To the extent that attitudes represent mental predispositions to perform, individuals' attitudes toward sex roles represent their motivation to arrange household work arrangements in a traditional versus an equalitarian pattern. Individuals expressing attitudes supportive of an equality between the sexes are expected to behave (that is, to allocate their time) in such a way as to approach an equalitarian division of labor between the spouses.

While sociological and socio-psychological theory provides an added dimension to the explanation of spouses' time allocation among household production, market work and leisure, it has several shortcomings. Little consensus exists concerning the mechanism by which such factors as role expectations, attitudes and interests are developed or by which they affect behavior. Role theory takes a functional stance, considering sex-role relationships as given or, at best, assuming that they result from the childhood socialization process and specifying that they operate as constraints and/or motivations on behavior. Resource and exchange theory assume a negotiation process, whereby spouses agree upon a pattern of labor division through the mutual resolution of conflicts; however, these theories specify few functional relationships among the relevant factors, spouses' resources or their factors of exchange, to explain observed differences in behavior among families. The exact mechanism operating to produce attitudinal-behavioral consistency is also not fully

specified; moreover, as Hansen (1976) summarized, "empirical evidence for such relationships is generally lacking, despite the existence of hundreds of studies searching for such relationships" (p. 222).

If it is conceded that the mechanism by which socio-psychological variables operate is left largely unspecified, it is also worth noting that the process by which individuals' productivity in time use is developed is also largely ignored. The relative productivity variable, individuals' potential market wage rate, is presumably the result of the individuals' investment of resources over a lifetime to the development of their human capital--their skills, knowledge, and abilities--of which the measured wage rate variable captures only a part. For purposes of empirical examination, it is assumed that the measured variables, individuals' attitudes toward sex roles and their expressed degree of interest in household production tasks, as well as their productivity in time use, capture at least part of the effects described here that lead to differences among individual and family time allocation behavior.

An Interdisciplinary Model of Spouses' Time Allocation

Recognizing that time allocation of spouses depends on productivity, tastes, and situational factors and, further, that the time inputs of spouses are interdependent, the following system of simultaneously determined equations composes the model of spouses' time allocation. It is composed of six equations, three each for husbands

and wives, which model their time allocation in the three major activities, household production, market work, and leisure.

Husbands' Time Allocation

$$H_h = f (W_h, H_w, M_w, L_w, Y, E_h, A_h, CP_h, AT_h, IN_h, AYC, D, S, ST, \bar{P}_X, \bar{K})$$

$$M_h = f (W_h, H_w, M_w, L_w, Y, E_h, A_h, CP_h, AT_h, IN_h, AYC, D, S, ST, \bar{P}_X, \bar{K})$$

$$L_h = f (W_h, H_w, M_w, L_w, Y, E_h, A_h, CP_h, AT_h, IN_h, AYC, D, S, ST, \bar{P}_X, \bar{K})$$

Wives' Time Allocation

$$W_w = f (W_w, H_h, M_h, L_h, Y, E_w, A_w, CP_w, AT_w, IN_w, AYC, D, S, ST, \bar{P}_X, \bar{K})$$

$$M_w = f (W_w, H_h, M_h, L_h, Y, E_w, A_w, CP_w, AT_w, IN_w, AYC, D, S, ST, \bar{P}_X, \bar{K})$$

$$L_w = f (W_w, H_h, M_h, L_h, Y, E_w, A_w, CP_w, AT_w, IN_w, AYC, D, S, ST, \bar{P}_X, \bar{K})$$

where the endogenous variables,

H_i = Household production time of i

M_i = Market work time of i

L_i = Leisure time of i

and the exogenous variables

W_i = Market wage rate of i

Y = Family income

E_i = Education of i

A_i = Age of i

CP_i = Competence of i

AT_i = Attitudes toward sex roles of i

IN_i = Interests in household production of i

AYC = Age of youngest child

D = Day of the week

S = Season of the year

ST = Situational factors affecting time use

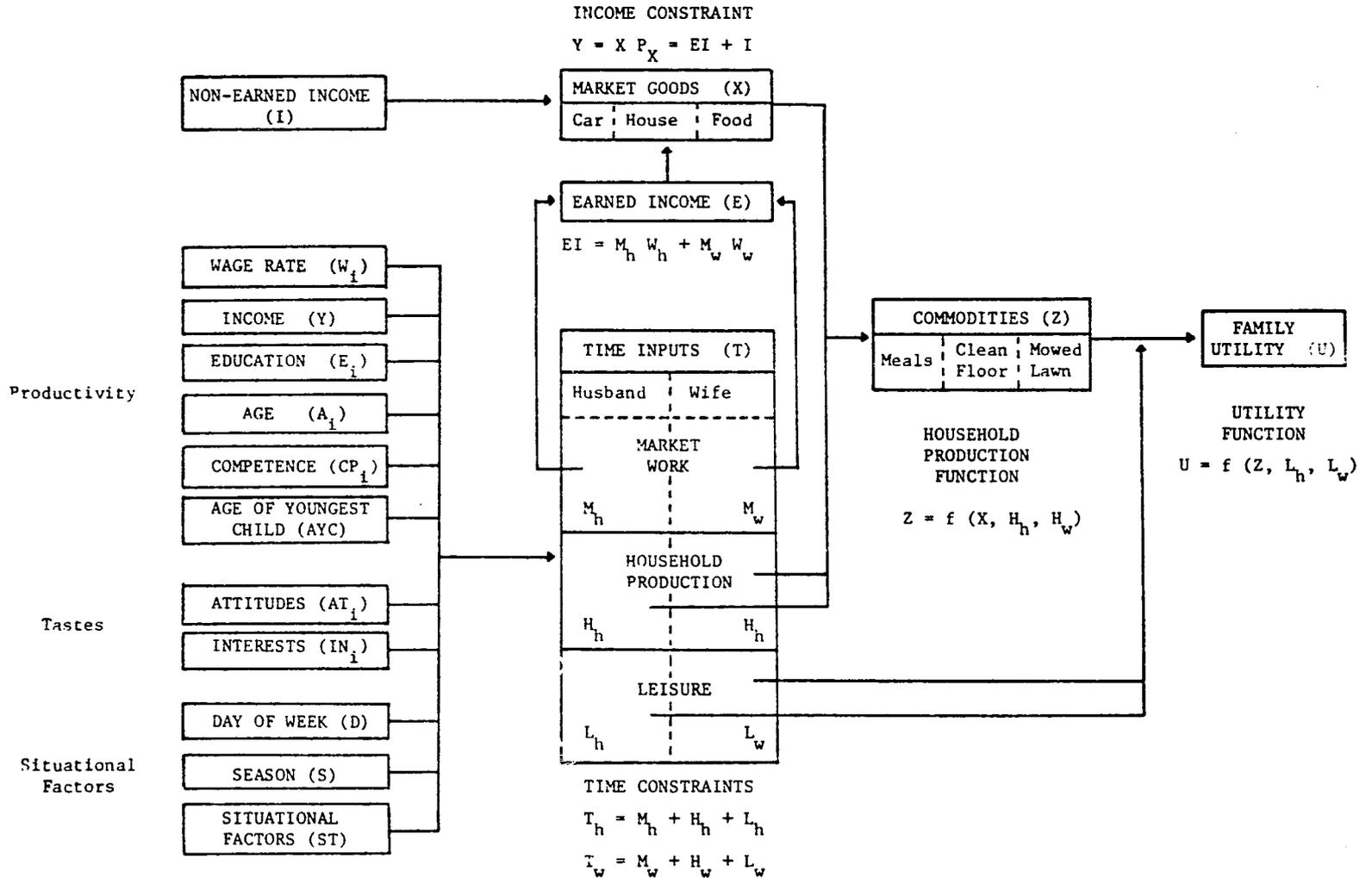
P_X = Price of market goods and services

K = Capital stock, i.e., household equipment technology.

The system of simultaneous equations assumes that the time allocation of husbands and wives are interrelated and simultaneously determined. Each of the six endogeneous variables, three each for the husband and wife, appears in only one equation as the dependent variable; they are to be examined together because of the time identity (i.e., $H_h + M_h + L_h = 24$ hours or 10,080 minutes) and their interrelated conceptual formulation. The two sources of simultaneity, the interrelationship between an individual's time use in the three activities and the interactive operation of the two spouses' time allocation, make this a classic case where a systems approach is useful. Figure 2 shows graphically the operation of the model of family time allocation.

In this model, husbands' and wives' time are jointly determined. One is not an exogeneous variable, determined first, that "causes" the other; however, they are related in a systematic manner. Most previous models have posited direct effects, for example, of wives' exogeneous characteristics such as age and education on husbands' time inputs into household production. In this system, no direct effects of a wife's characteristics on her husband's time inputs into household production are hypothesized; rather they operate indirectly via the relationship between her time use and his time use.

Figure 2
Model of Family Time Allocation



This model suggests that a husband's time input into household production is a function of his wage rate, family income, his wife's time allocation, education, age and competence at household production, his attitude toward sex roles and interests in household production tasks, the age of their youngest child, and situational factors such as the day of the week, the season of the year, and the existence of situational factors. Similarly, a wife's time input into household production is a function of her wage rate, the family income, her husband's time allocation, her education and age and household production competence, her attitudes toward sex roles and interests in household production, the age of the youngest child, and the same situational factors.

These variables are expected to influence the allocation of time to household production of the spouses either through their effect on the relative productivity of the individuals in both market work and household production (wage rates, income, education, age, competence, and age of the youngest child), their effect on the "tastes" of individuals for household production (attitudes and interests), or their effect as constraints on their time use (day of the week, season, and situational factors). The latter set of variables, situational factors, such as physiological and meteorological situations, are assumed to be exogenous constraints over which individuals have no control but nevertheless may influence their use of time.

Although the estimation of the model will be discussed more thoroughly in Chapter Four, several points are in order here. The general model combines all time inputs into household production of

husbands and wives. An extension of the model which includes the various components of household production--i.e., food preparation, marketing and management, home, yard, car and pet care, clothing care and construction, and family care--is possible using the same construct. In this model, joint production in the situation where two or more activities occurred at the same time is ignored; secondary time inputs must be omitted in order to argue the time identity. In addition, given the geographic proximity of the sample and the cross-sectional nature of the time inputs samples, it may be assumed that prices of market goods and services (P_X) and the capital equipment technology available to families (K) are constant across families. Thus, P_X and K are no longer arguments in the estimation of time allocation function (Hunt & Kiker, 1978). Finally, for those spouses who are not employed or are not employed full time, and thus report no observed market wage rate, the wage rate is assumed to be the potential market wage rate of the individuals if they employed their stock of human capital in the labor market.

Hypothesized Relationships

The value of economic theory for the analysis of the time allocation of spouses rests with its implications for the relationships predicted between their time inputs and the relevant economic variables. Partial equilibrium analysis has specific applications in predicting relationships between the demand for goods (analogous here to spouses' time inputs) and their prices and family income. For example, when

the demand for good X is expressed as $D_X = f(P_X, \bar{P}_Y, \bar{Y})$, which is analogous to the expression $H_h = f(W_h, \bar{W}_w, \bar{Y})$, partial equilibrium analysis predicts the effect of a change in the price of a good on the quantity demanded, holding other prices and income constant; that is, it shows the ceteris paribus effect of a change in price.

The pure substitution effect due to the price change is always in the normal direction, i.e., an increase in price leads to a decrease in quantity demanded and vice versa. Here, an increase in an individual's wage rate (the price of market work time and the shadow price of time inputs into household production and leisure) leads to an increase in market work time and an accompanying decrease in the individual's household work time and leisure. The income effect is the result of the change in "real income" or the level of purchasing power that accompanies the price change. Thus, as increase in income (which results from an increase in market wage) increases demand for leisure (the only time use that is normal economic "good") and the demand for market work and household production time decreases.

As a consequence of the operation of the substitution and income effects, the uncompensated wage effect may be either positive or negative for market work time. If it is negative, a backward-bending labor supply curve results. As the wage rate of an individual increases beyond some point, the income effect outweighs the substitution effect to decrease hours worked, and thus increase the sum of non-market time, i.e., household production plus leisure. If the total wage effect is positive, the more common situation occurs. As wage rates rise, the substitution effect dominates the income effect to increase hours of market work and decrease non-market time.

The wage effect on household work time of husbands is expected to be negative; that is, an increase in their wage rates is expected to result in a decrease in time inputs into household production. As Gronau (1977) explained:

If the person works in the market . . . a change in wages affects both the rate of substitution between consumption time and goods and the profitability of home production. The increase in wage lowers the price of goods in terms of time, thereby making home production less profitable and inducing substitution of goods for consumption of time. The change will, therefore, definitely cut work at home. (p. 1108)

Gronau's discussion describes only the effect of a wage change of one individual on that individual's time allocation. An increase in the husband's wage rate, representing the price of his time in home production, could in a family situation include effects on the time inputs of the wife and vice versa. Examination of the coefficients associated with the wife's time inputs in the husband's equation allows conclusions about the relationships between time inputs of spouses, or the cross-substitution effect. These coefficients show whether husbands' and wives' time inputs into household production are complements or substitutes in the sense that changes in the price of one spouse's time either increases or decreases the relative marginal productivity of the other's time inputs.

Examination of the coefficients associated with family income permit analysis of the income effect on time inputs into household production (which in theory should be similar to the income effect of a price change). For an individual, the effect of an increase in non-earnings income is definitely associated with an increase in the

demand for leisure because leisure is unambiguously assumed to be a normal good. If it is assumed that time inputs are proportional to the production of basic commodities (Z's), similar conclusions about the normality or inferiority of household production time inputs can be made. Examination of the income coefficients in the equations for the various categories of household production allows the determination of which time inputs produce normal goods, those for which demand increases as income increases, and those time inputs that produce inferior goods for which demand decreases as income rises. An increase in the family's non-earnings income does not affect the productivity of either spouse at home or in market work, although the income effect may result in an increase in leisure at the expense of market work time. If the individual is not employed in the labor market, the income effect unambiguously increases leisure which can only result from a decrease in the time inputs to household production.

The three previously discussed effects, the wage effect, the income effect, and the cross-substitution effect, may all be discussed in terms of elasticities, the percentage change in one variable divided by the percentage change in another variable. Elasticities are useful particularly when the variables are measured in different units, i.e., minutes and dollars. The elasticity is a convenient summary measure of the responsiveness of the quantity demanded of a good to the factors which influence that demand because it is independent of the unit of measurement. Appendix A discusses the derivation and use of elasticities as employed in this study.

Classical demand functions and the resulting elasticities are estimated under ceteris paribus conditions, that is, with all other factors that affect the demand for a good held constant. In this model, other factors that affect the allocation of time are included in the equations and are, thus, empirically controlled. Some of these factors affect spouses' allocation of time through their effect on the productivity of individuals. Usually, human capital variables such as age and education are used to represent the "know-how" or productivity of individuals in household work and other activities. However, changes in educational levels of husbands (and wives) have several potential, possibly contradictory effects: (1) its effect on the labor force participation hours, which would by definition affect time for household production and leisure, which is hopefully captured by the inclusion of the productivity measure, the wage rate; (2) its "true" effect on productivity in household production, which would make the per-unit production of home commodities less time consuming if productivity increased; and (3) its effect on the preference variables through its relationship with individuals' attitudes toward sex roles and their interests in household tasks. As Hunt and Kiker (1978) maintained, "education has an unexpected influence on the division of home labor which indicates that its importance may lie in its influence on tastes rather than on market productivity" (p. 19).

In any case, in the present model the use of the preference variables may partial out the effect of education on tastes. The simultaneous estimation of market work hours and the inclusion of the wage

variable may also capture the partial relationship between education and productivity in labor market work. Including the self-rates competence in the equation for household production of husbands also attempts to capture the true productivity effect of husbands' education. According to Gronau (1976), on the one hand, an increase in productivity:

reduces the price of home commodities and raises the demand for them, and on the other, the time required for producing one unit of home commodity declines. Hence, an increase in home productivity increases the demand for the woman's (man's) time at home only if the rate of increase in the quantity of home commodities demanded exceeds the rate of increase in productivity. (p. S204)

Another effect potentially captured by educational level is the increased demand for home commodities, which may be particularly influential in the examination of the time inputs into family care, a time intensive activity generally thought to be related to the educational level of the spouses (Leibowitz, 1974).

Gronau (1976) also posited additional effects of education on productivity and time in household production that are not captured by the modeled relationships. Because education is also related to market productivity and tastes for market work, "psychic" rewards received from labor market employment in addition to any monetary benefits may induce increased hours of market work. As Gronau (1976) posited:

Changes in education may have a long-range effect on the wife's (husband's) future earning stream which is not captured by the measures of current money wages and income. Other things being equal (in particular the pecuniary wage), the effect of education of participation is indeterminate because of the probable

conflict between the effect education has on the demand for the woman's (man's) time at home and its effect on the unmeasured component of the wage rate and earnings. (p. S204)

Unfortunately, no good measure of the effects of education on the earnings stream of the spouses over the lifetime, and therefore, on some lifetime measure of productivity, is available.

The effects of age on husbands' time inputs into household production are equally complex. Its effect may be non-linear over the range of an adult's life because of its association with the stage of the family life cycle and the presence and age of children, which in turn are associated with the demand for certain home-produced commodities and individuals' productivity in home production. Age also is related to productivity in labor market work, but this effect, as is the similar effect of education, is hopefully captured by the inclusion of the market wage variable. But, as Ghez and Becker (1975) explained, age may also serve as a proxy for other effects: cohort effects on tastes, hopefully captured here by the inclusion of the preference variables, and life-cycle time allocation decisions which may affect subsequent decisions.

The remaining variables in the time allocation functions of the spouses are those either related to individuals' tastes (their attitudes toward sex roles and their interests in household production tasks) or are situational constraints on their time use (day of the week, season, and the existence of situational factors affecting time use). Recall that the price of market goods and services and the available capital goods technology are assumed to be constant across

the sample. Note, also, that individuals' tastes may be the result of their time allocation decision, a possible source of bias in these coefficients.

Individuals' attitudes toward sex roles are expected to have a positive relationship with time inputs into household production, when high scores on the attitude scale are indicative of relatively more equalitarian attitudes. Interests in household production tasks are less clear in their effects on household work time. For an individual, high interest in household tasks should be associated with larger amounts of time inputs in household work or at least in those tasks which the individual likes. However, if a family situation, trade-offs may be made by which one or both spouses may perform disliked tasks or some negotiated combination of agreeable and disagreeable tasks. The relationships between individuals' time inputs into household production and situational factors are held constant to empirically control for differences caused by the sampling and data collection process. Although no a priori predictions are suggested by theory, husbands are expected to spend more time in household production on weekend days than on week days, during the summer than during non-summer months, and on days with fewer situational constraints on time use.

In summary, because consideration of economic forces is ubiquitous in modern life, it is little wonder that economists have attempted to explain time allocation and other human behavior via market price mechanisms. Economists argue, in effect, that

individuals accurately perceive the value of their time, i.e., that they are aware of the relative marginal productivity of their time inputs in various activities, and, further, that this price mechanism is the primary criterion by which decisions are made. Regardless of the monetary costs, even if they are accurately perceived and measured people may make choices based on other criteria--the psychic costs, for example, associated with non-conformance to societal norms or with spending time in distasteful activities.

The time allocation functions modeled here are not strictly comparable to the traditional demand functions for consumer goods in several respects. The combination of time inputs and goods to produce home commodities complicates the decision process beyond the simple maximization of a demand function subject to an income constraint. When the labor-leisure dichotomy is abandoned in favor of a more realistic trichotomy, including household production, and when the model is extended beyond one individual's decision to include multi-person time allocation, the picture becomes even more complex. Changes in any of the exogeneous variables may produce any of several adjustments by either spouse or both. Although individuals' time inputs are compared to consumer goods, i.e., they are discussed in terms of income and substitution effects and elasticities, the predictions are not as clear as they are in the case of consumer goods. Many of the relationships are empirical questions. Nevertheless, examination of the relationships and effects proposed by the model provides at least some explanation of why husbands and wives allocate their time as they do.

CHAPTER IV

METHODOLOGY

The data for this study were collected in 1977 as part of an interstate project comparing the time use of families in 11 states. The study was designed and coordinated by Kathryn Walker and associates at Cornell University and the North Carolina cooperative effort was directed by Mohamed Abdel-Ghany. The author participated in the North Carolina study as research assistant and field coordinator. Much of the procedure and research design were standardized for use in the interstate study; additional instruments were designed by Abdel-Ghany and the author for use only in the North Carolina study.

Sampling Area

A primary requirement in selecting a sampling area was that the area yield a sample of rural residents without proximity to or access to a large metropolitan area in North Carolina. Because of travel time and expense, it was decided to limit the sampling area to one rural county in North Carolina. A consultation with Dr. Gordon Bennett of The University of North Carolina at Greensboro revealed that a total of nine counties in North Carolina were entirely rural. Of these, Pamlico County, a rural county of 338 square miles in eastern North Carolina, was selected as the sampling area. The population of the county in 1977 was estimated at 9,800, and the

population per square mile was 29.0 persons. There were no towns of 1,000 or more with the largest town and county seat, Bayboro, having a population of 860 people. In 1977 there were 2,886 households, averaging 3.28 persons per household, in the county (North Carolina State Government Statistical Abstract, 1979). The county was judged by the researchers and the consultant to be a typical rural county in North Carolina.

Selection of Sample

Because in previous studies family composition was found to be an important determinant of household work time, data were obtained from a stratified random sample of 105 families, stratified by age of the youngest child. Only two-parent households with two children, the youngest of which was under 17 years old, were included. Because of the constantly shifting ages of the children, it was necessary to select a cut-off date for the standardization of ages. A child was considered to be the age he/she was at the time of the sampling if his/her birthdate had occurred within four months of the sampling time. If more than four months had passed since the child's birthdate at the time of the sampling, he/she was classified according to his/her true age.

A population of two-parent, two-children families in Pamlico County was established by first conducting a survey within the four county schools. A data sheet requesting the name of the parents, their address and telephone number, the number of adults in the home,

the number of children under 18 years of age living in the home, and the age of the youngest child, was distributed to each student in homeroom class. Of approximately 1,800 data sheets distributed, 1,523 were returned. The data sheets were divided into those families consisting of two adults and two children, and those with other family compositions. The two-parent, two-children families were then classified according to the age of the youngest child into one of the five sampling categories, under one, one, two to five, six to eleven, and twelve to seventeen years old, and listed in alphabetical order.

To complete the population of families with two parents and two children, the birth records for the years 1971-1976 were examined. A record of a birth that showed one previous birth to the mother was included on the list. A check was made to see that families had not had a third child in the more recent years. Those families with exactly two children were incorporated into the previous lists with duplicates being eliminated. A total of 288 families with two parents and two children under 18 years old were included in the population. Thirty-five families in each of the five categories were randomly selected from the lists to provide for replacement families should any of the first 21 families selected in each category be ineligible or unwilling to participate.

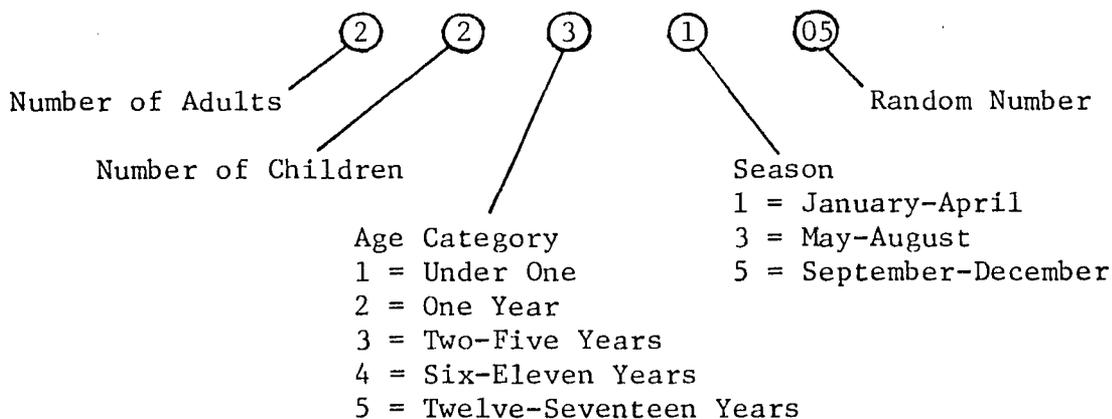
Interview Procedure

Contacting the Families

To control for variations in time use on different days of the week and during different seasons of the year, the sample was also

stratified by day of the week and season. The year was divided into three four-month periods: January through April, May through August, and September through December. Thirty-five families were interviewed during each of these periods. The interviews were also evenly distributed over the seven days of the week such that exactly one family from each of the five age categories was interviewed on any one day of the week. Thus, seven families (one interviewed on each day of the week) in each of the five categories composed the total of 35 families interviewed during each four-month sampling period, which comprised the total of 105 families interviewed.

Each family on the list was assigned a six-digit sampling number:



One of two interviewers (of which the author was one) contacted the families in each category in the order in which they were randomly selected. A family was contacted a minimum of four times by telephone during different days and at various times of the day in order to attempt to schedule an interview for the appropriate day of the week. If there was no telephone number available, the interviewer contacted the family at their home to arrange for the interview.

During the initial call, the interviewer introduced herself and the project and ascertained that the family composition was accurate according to the records. If the family fit the sampling characteristics and agreed to be interviewed, the day and time of the interview were arranged and recorded on a sampling form. During the year, a total of 193 families were contacted to obtain the 105 families interviewed; the reason was recorded on the sampling form. Non-interview reasons included:

Moved out of sampling area	11 families
Did not fit sample	19 families
Refused interview	22 families
No one at home after four calls	21 families
Vacant addresses	<u>15 families</u>
Total	88 families

Interviews

To obtain data on a representative length of time use for each family, two interviews covering two 24-hour periods were conducted, the first one on the original scheduled day and the second on the second day after the first interview. The first interview consisted of recalling the time use of the previous day, while the second day's information was recorded by the homemaker for the day between the two interview days. On the second interview the interviewer collected the time charts and verified their completeness.

The interviewer visited the family during the day or night scheduled. After introducing herself and giving a brief description of

the project, the definitions of activities of household production (Appendix B) and instructions for the homemaker for keeping the time record were given to the homemaker. The time chart (Appendix C) was then completed for the first day's activities with the time use for every family member over six years of age being recorded using the appropriate symbols. A check was made to ascertain that 24 hours were accounted for by each family member.

Demographic information for the family was then recorded. Then the attitude scale (Appendix D) and the interest and competence instrument (Appendix E) were explained, and any questions about them were answered. Two sets of these questionnaires, one for each spouse, were left with the family with instructions to the family members to complete them separately and without collusion before the next interview. The homemaker was also instructed to complete a second time-use chart for the following day to be collected by the interviewer on the second interview day. A second interview time was scheduled for two days later. Materials left with the homemaker included the first time chart to use as a guide, a second time chart to complete, the definitions and instructions for completing the time chart, a red and blue pencil, and two copies of the attitude and interest and competence instruments.

The interviewer returned to the home two days after the first day to collect and check the second time chart and to collect the other instruments. Any questions about the second time chart were answered, and it was checked to ascertain that 24 hours were recorded for each family member over six years of age. The other instruments were

collected and checked for completeness. The homemaker was thanked for her cooperation, and a small gratuity (a silver dollar) was given to her as a token of appreciation. Not until this time was the gratuity mentioned; thus, no effect of the payment should have occurred.

Instruments

Time Chart

The time chart (Appendix C) was designed by Walker and associates to record time use by each family member over six years of age. A vertical column of household activities, work, leisure, and miscellaneous categories were located on the left and right sides of the chart. A horizontal row of hours from twelve o'clock midnight to twelve o'clock midnight was located at the top of the chart. Ten-minute intervals of time were evenly spaced across the chart.

Instructions for the completion of the time-use chart are included in Appendix B. All females' time was recorded in red; all males' time use in blue. The time use of the homemaker, the adult primarily responsible for the management of the home, was recorded as "H." The time use of the spouse was recorded as "S." The time use of children over six years of age was recorded as the age of the child in the correct color. For example, if the child was a 13-year-old male, his symbol would be a blue "13." If the child was a seven-year-old female, her symbol would be a red "7."

Attitudes Toward Feminism Scale

Developed by Richey (1972), the Attitudes Toward Feminism Scale (Appendix D), a Likert-scale consisting of 55 relatively extreme positive and negative statements concerning the economic, domestic, political-legal, and social status of women, was utilized to obtain data on husbands' and wives' attitudes toward sex roles. In the original study, factor analysis identified the factors within the scale and supported its construct validity. The reliability of the scale in the original study, calculated by an odd-even split-half method, was +.87. Each spouse was instructed to separately report his/her feelings about each attitude statement by checking one of five responses: strongly agree, agree, undecided, disagree, and strongly disagree. Factor analysis was conducted by the author on the respondents' answers to investigate the use of factor scores in subsequent analyses. This factor analysis provided no conceptually or empirically valid constructs for computing factor scores for the attitudes variable; thus, raw summated scores for each individual were used in subsequent analyses.

Interest and Competence Instrument

The interest and competence instrument (Appendix E) was developed by Abdel-Ghany and the author and based on a scale designed by Kellar (1934), the Attitude Toward Any Homemaking Activity Scale. The 17 items, ranging from "I get great pleasure out of doing this" to "I absolutely refuse to do this," were arranged vertically with the scale values of the items ranging from 10.2 to 1.1. The respondent was

directed to check each of the 17 items which he/she agreed with with respect to the twelve household activities listed horizontally at the top. Six of the activities listed, cooking, cleaning house, washing dishes, repairing clothes, physical care of child, and grocery shopping, were activities designated as feminine-stereotyped activities. The remaining six activities, paying the bills, taking out the garbage, fixing the sink, mowing the lawn, maintaining the car, and helping children with homework, were designated as masculine-stereotyped activities. A score consisting of the sum of the scale values of all items checked by the respondents was assigned to each husband and wife for each of the 12 activities. Possible scores ranged from 100.5 to 1.1. The competence score was derived from the respondents' ratings of themselves on the same twelve activities on a five-point scale, including excellent, very good, good, fair, and poor.

Statistical Estimation of the Model

The model presented in Chapter Three is a system of interdependent equations, which suggests that the use of ordinary least squares regression techniques, is inappropriate. Because of the simultaneity of husbands' and wives' household production time and their market work and leisure time, and because the wife's and husband's time allocation are posited to be simultaneously determined, a simultaneous estimation procedure seems warranted. Even if each equation is technically capable of being estimated via ordinary least squares, as they are if none of the dependent variables appears in any of the other equations as independent variables, single equation estimation

techniques yield inefficient parameter estimates, because all of the information on the interrelationships in the system is not utilized. Thus, in addition to the use of ordinary least squares (OLS) estimation technique, three-stage least squares (3SLS) will be used in the estimation of the models.

The general form of a three-equation simultaneous system estimated via 3SLS is:

$$H = \alpha_0 + \alpha_2 M + \alpha_3 L + \alpha_4 X_t + \mu_1$$

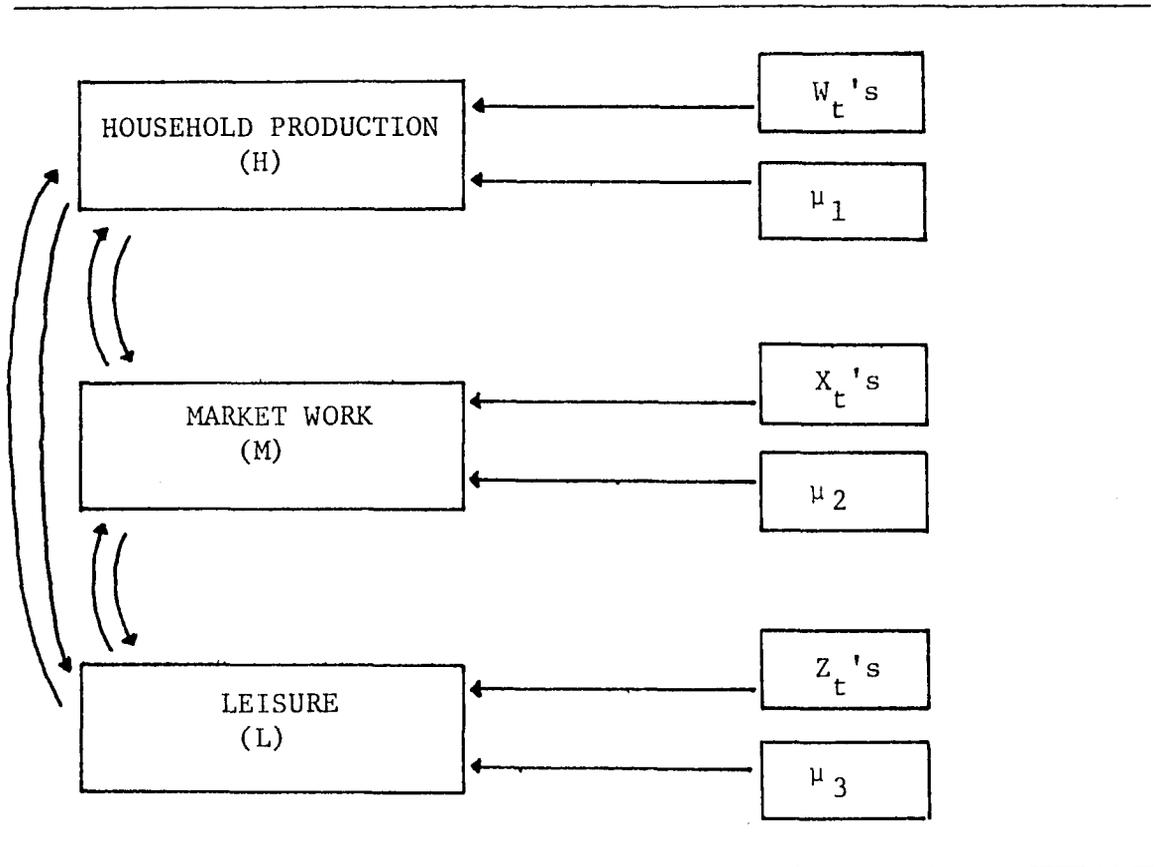
$$M = \beta_0 + \beta_1 H + \beta_3 L + \beta_4 X_t + \mu_2$$

$$L = \gamma_0 + \gamma_1 H + \gamma_2 M + \gamma_4 X_t + \mu_3$$

where the symbols of the endogenous variables are identical to those in the model in Chapter Three, X_t is a vector of exogenous variables that appear in the right-hand side of the equations and μ_1, μ_2, μ_3 are stochastic error terms.

As illustrated in Figure 3, it is impossible to solve one equation without solving all three equations simultaneously. The predetermined variables (X_t) and the disturbance terms (μ_1, μ_2, μ_3) directly influence the endogenous variables (H, M, L), but are not in turn influenced by them. In contrast, there is a feedback relationship or interdependency among the endogenous variables. For example, H is dependent on both M and L and also influences the values of M and L . Although each of the error terms obeys all the assumptions of ordinary least squares when considered separately, ordinary least squares would yield biased and inconsistent estimators, because of the indirect correlation of the error terms, i.e., because M and L are correlated with μ_1 .

Figure 3
 The Relationship Modeled by Three-Stage
 Least Squares General Model



The actual procedure generated by 3SLS involves the following steps if the objective of the procedure is to generate efficient estimators for the household production equation. First, it regresses the endogenous variables M and L (the regressors correlated with the error term in the household production equation) on all the exogenous variables in the three-equation model. The second stage involves determining the estimated values \hat{M} and \hat{L} for inclusion in the third stage. These estimated values are substituted for M and L,

respectively, in the equation for H to solve the household production time allocation equation for the estimators $\hat{\mu}_0, \hat{\mu}_1, \dots, \hat{\mu}_k$. \hat{M} and \hat{L} are those estimated components of the market work and leisure time variables which are uncorrelated with μ_1 , the error term of the equation of primary interest. Finally, all the parameters in the system are estimated via generalized least squares using the predicted values of the endogeneous variables.

Actually, three-stage least squares is an extension of two-stage least squares (2SLS) in that the first two stages of the former are identical to those of the latter. The improvement of 3SLS over 2SLS is that the former uses the information on the correlation of the disturbance terms in order to improve the asymptotic efficiency of the estimators. That is, as the sample size increases without limit, the expected values of the coefficients equals their "true" values, i.e., the standard errors approach zero.

Three-stage least squares may also be viewed as an extension of Zellner's method of seemingly unrelated regression. The general form of a three-equation system estimated by this technique is:

$$H = \alpha_0 + \alpha_1 W_i + \alpha_2 X_i + \mu_1$$

$$M = \beta_0 + \beta_2 X_i + \beta_3 Z_i + \mu_2$$

$$L = \gamma_0 + \gamma_1 W_i + \gamma_2 X_i + \gamma_3 Z_i + \mu_3$$

where $H + M + L = 1$ (or any constant, such as 24 hours), and W_i , X_i , and Z_i are sets of independent variables, each of which must appear in at least two equations. As illustrated in Figure 4, the difference between 3SLS and SUR is that, in the latter, there are no explanatory

Figure 4

The Relationship Between Ordinary Least Squares
(OLS), Two-Stage-Least Squares (2SLS), Three-
Stage Least Squares (3SLS), and Zellner's
Seemingly Unrelated Regression (SUR)

	No explanatory endogeneous variables used	Explanatory endogeneous variables used
Estimate a single equation from a system of equations	OLS Separate estimate of structural equations	2SLS Two-stage least squares estimation
Estimate all equations of a system simul- taneously	SUR Zellner's seemingly unrelated regression	3SLS Three-stage least squares estimation

endogeneous variables in the system, i.e., none of the time-use variables appears in the right-hand side of any of the equations. Each equation could be estimated using ordinary least squares to produce unbiased and consistent estimators. However, the simultaneity bias occurs because of the time identity and the resulting interdependence of the error terms. Because $H + M + L = 1$, $\mu_1 + \mu_2 + \mu_3 = 0$. The efficiency of the estimators is improved if the correlation across equations is considered; that is, the mean square deviation of the estimators about their true values is minimized.

In this method, because of the identity of the dependent variables, each of the independent variables must appear in at least two equations. The arithmetic of the model guarantees, for example, that if for a given individual a change in W_i produces a change in H , a reciprocal change in one of the other variables M or L must occur. The SUR technique actually guarantees this restriction by estimating the sums of each of the equations for each observation:

$$1 = (\alpha_0 + \beta_0 + \gamma_0) + (\alpha_1 + \gamma_1) W_i + (\alpha_2 + \beta_2 + \gamma_2) X_i + (\beta_3 + \gamma_3) Z_i + (\mu_1 + \mu_2 + \mu_3).$$

where for every observation $\mu_1 + \mu_2 + \mu_3 = 0$ (Pindyck & Rubinfeld, 1976).

The choice between estimation techniques is generally determined by the specification of the model, where there is definitive theory that suggests such a specification. However, the properties of the estimators are different; choices are sometimes made on the basis of the large and small sample properties of competing techniques or one is chosen because it produces estimates with particularly desirable properties. While all of these estimators other than those produced by OLS are consistent and asymptotically (referring to large samples) efficient, less is known about their small sample properties.

Small sample properties are generally studied using the Monte Carlo approach, where known parameters, specified a priori, are estimated with the various techniques to determine which technique produces the best estimates. The results of these studies must be treated as tentative because, as Intriligator (1978) explained:

Differences between estimators are often not large and the results often vary more significantly with the choice of the model and the choice of values of the exogenous variables and elements of the covariance matrix than with the choice of a particular estimator. In terms of actual econometric studies, the data frequently exhibit such inaccuracy and/or the specification of the model is so uncertain that any reasonable rounding off of results would tend to eliminate the differences among the rival estimators. (p. 419)

Most econometricians agree that there usually is little difference between techniques, that is strictly solely accountable to the techniques themselves. In this study, the system of equations was estimated using the 3SLS procedure. Because of the time identity between the husbands' three equations and because identical sets of exogeneous variables were included in each husband's equation, the parameter estimates of two-stage and three-stage least squares are identical (Intriligator, 1978). Thus, the exact specification of the husband's household production equation, for example, is:

$$H_h = \alpha + \beta_1 W_h + \beta_2 Y + \beta_3 H_w + \beta_4 M_w + \beta_5 E_h + \beta_6 A_h + \beta_7 Cp_h + \beta_8 AT_h + \beta_9 IN_h + \beta_{10} AYC + \beta_{11} D + \beta_{12} S + \beta_{13} SIT + \mu_1.$$

This procedure yields parameter estimates, their standard errors and associated t-values which test the statistical significance of the relationships posited.

Caution, however, must be used when making these comparisons since (1) the standard errors of the coefficients and their associated t-values in the 3SLS procedure are only asymptotic (accurate as the sample approaches infinity), and (2) the R^2 generated for the system

is not strictly comparable to that produced by OLS; rather, the former measures the variability in the dependent variables explained by the entire system of equations. Also, the coefficients for wives' time inputs in the husbands' equations are different. In the OLS estimates, wives' time inputs are the actual number of minutes spent by wives while in the systems estimates the included variables are predicted values of wives' time inputs generated by the first-stage reduced form equations.

Operational Definitions of the Variables

Several technical notes on the operational definitions of certain variables are in order. First, the time input variables of both husbands and wives were operationally defined to include in the leisure time inputs activities not conceptually defined as leisure. Rather, to argue the time identity, leisure was treated as the residual time left after market work and household production. Most importantly, this operational definition of leisure included non-market work outside the home (volunteer work, for example) and "consumption" activities, such as eating, sleeping, and personal care. The latter type of activity, however, is compatible with the requirement that leisure be inseparable from the individual and yield direct utility. A person's time in eating, for example, produces direct utility only for himself or herself and has no relevant market substitute.

There were several possible forms of the dependent time inputs variables, given that each individual reported two days' time use.

Several forms were constructed (first day and second day time inputs computed separately for 105 families, combined two days' time inputs for 210 observation days, the average time inputs across two days, and weekly estimates for those spouses for whom one weekday and one weekend day was recorded). The latter form, the weekly estimates, were both conceptually more appropriate and empirically more viable. Thus, for all subsequent analyses, weekly estimated time inputs were computed by weighting the weekday time inputs by five and the weekend day time inputs by two. Although this procedure generated time use data for the spouses over a longer time period, it may have multiplied the effects of any random variability due to the possible uniqueness of the randomly-selected sampling days.

Because non-employed wives had a recorded wage rate of zero, it was necessary to input a wage rate for the wives. Since the small number ($n=32$) of employed women was deemed an insufficient number of subjects upon which to perform a regression for computing a potential wage for the other wives, a regression from a national sample of wives was used to generate these imputed values. Garfinkel and Haveman (1978) used data from the Current Population Survey of 1971, aged and adjusted to represent the population in 1973, to estimate the predicted natural log of earnings of wives working full-time and 50-52 weeks per year. The log of annual earned income was the dependent variable and the independent variables represented individuals' demographic and human capital characteristics--age, education, race, marital status, location, and work time per week and year. Separate

equations were estimated for white and black women; the R^2 's were .603 and .634, respectively. The estimated earnings functions for white wives was

$$\begin{aligned} \log \text{ EARNINGS} = & 7.1515 - 0.0106 E_w + 0.0033 (E_w)^2 + 0.0479 A_w \\ & - 6.0000 (A_w)^2 + 0.0001 (A_w \times E_w)^2 - 0.0416, \end{aligned}$$

and for black wives was:

$$\begin{aligned} \log \text{ EARNINGS} = & 7.5754 - 0.0229 E_w + 0.0047 (E_w)^2 + 0.0234 A_w \\ & - 0.0004 (A_w)^2 + 0.0004 (A_w \times E_w) - 0.2017. \end{aligned}$$

The final coefficient in each equation represents a dummy variable for South when compared to the North Central location. Dummy variables for weeks worked, full-time work, non-urban location, and marital status were excluded, because the omitted category was the relevant characteristic for this sample.

To calculate wives' wage rate for this sample, the estimated coefficients were applied to the wives' characteristics. To convert the log of earnings to dollar earnings, the exponential of the computed value was taken. To calculate an hourly wage from these predicted dollar earnings the annual dollar earnings were divided by 2000 hours (40 hours per week x 50 weeks per year). Because the estimated hourly wage rates were computed in 1973 dollars, it was necessary to inflate them to 1977 dollars. The Consumer Price Index for 1973 (133.1) and for 1977 (181.5) were used to produce the weighting coefficient of 1.3636364 (the latter divided by the former). The mean predicted wage rate for the sample wives, when adjusted for inflation was \$3.02 and the standard deviation was .0455. These

estimated wage rates were entered into the equations as the predicted potential wage rate (shadow price of non-market time) of women if they were employed in the labor market full time.

In attempting to obtain an operational measure of the families' non earned income, the earned income of both husband and wife (calculated from their reported wage rates and market work hours) was subtracted from their reported total net income. Measurement error was undoubtedly present because of the categorization of family income which was necessary to attain responses by the subjects. Because this procedure yielded, in some cases, negative values for non-earned income, it was decided to use, instead, the total family income as reported. Note that this "contaminates" the coefficients obtained for the income effect on time allocation because the income variable used contains not only income obtained from non-market sources, but also earned income derived directly from market work.

Although no particularly significant reason exists to expect that time allocation differs by race (when other productivity and taste factors are controlled), a dummy variable for race was included as an exogenous variable in some of the preliminary regressions. However, its effect was never statistically significant, probably due to the homogeneity of the sample families all of which were from the same rural area.

The remaining exogenous variables were operationally defined in a straightforward manner. Ages, education, competence, attitudes, and interests of spouses, as well as the age of the youngest child, were entered into the regression equations as continuous variables. Season

of the year and situational factors were entered as dummy variables. Season of the year was entered as one if the interview was during the summer, and as zero if otherwise. Situational factors were entered as one if the respondent indicated that there were situational (physiological/meteorological) constraints on their time use, and as zero if otherwise.

CHAPTER V

RESULTS AND DISCUSSION

The first part of the chapter includes descriptive data on the characteristics of the sample husbands and wives and their time allocation into household production, market work, and leisure. Descriptive results on the spouses' time allocation are presented not only for Day 1 and Day 2 separately ($n=105$), but also for the weekly estimates of time allocation for those spouses for whom one weekday and one weekend day were recorded ($n=60$). In addition, the mean values of the exogenous variables used in the estimation of the model are reported.

The latter part of the chapter presents the results of the statistical estimation of the model described in Chapter III. First, ordinary least squares (OLS) estimates, using hierarchical regression with and without the additional productivity and taste variables are presented for husbands' time in household production. These results are analyzed primarily according to their usefulness for predictive purposes. Then the results of the estimation of the 2SLS/3SLS procedure for husbands' time in household production, market work and leisure are presented. Particular attention is paid to the relationships between husbands' and wives' time allocation in the three activities.

Finally, both OLS and 2SLS/3SLS results for husbands' time inputs into the five categories of household production are presented. The differences between the estimation methods are discussed and the

substantive results concerning the effects of the exogenous variables on husbands' time in food preparation, marketing and management, home, yard, car, and pet care, clothing care and construction, and family care are reported.

Description of the Sample

Presented in Table 2 are the demographic data for the sample in this study. Their characteristics were typical of a sample of rural, two-parent, two-child families with a child under 18 years of age. Wives' mean age was 32.5 years while husbands' age averaged 35.4 years. Sixty percent of the wives had a high school education while about 13 percent had less education and about 27 percent had more education than high school, either college or technical training. Their mean educational level was 12.1 years. Husbands' mean education was 12.2 years. However, about 25 percent of the husbands completed some training beyond high school while about 55 percent finished high school. Twenty percent had less education than high school.

As expected, because of the sampling requirement that a family have exactly two children, non-white families were underrepresented, comprising only 19 percent of the sample while white families comprised the remaining 81 percent. Non-white families with the required two children were rare in the sampling area where mean family size of black families was higher than for white families.

The total family income averaged \$18,550 with the distribution of the income of the sample families being fairly typical. About 12 percent of the families reported incomes of less than \$10,000 while about

Table 2
Demographic Data for the Sample Spouses

Characteristics	n*	Percent ¹
Age of Wife		
Less than 25	12	11.4
25 - 29	38	36.2
30 - 34	18	17.1
35 - 39	18	17.1
40 - 44	11	10.5
45+	<u>8</u>	<u>7.6</u>
Mean age of wives = 32.5 years	105	99.9
Age of Husband		
Less than 25	4	3.8
25 - 29	29	27.6
30 - 34	18	17.1
35 - 39	25	23.8
40 - 44	15	14.3
45+	<u>14</u>	<u>13.3</u>
Mean age of husbands = 35.4 years	105	99.9
Education of Wife		
Eighth grade or less	2	1.9
Partial high school	12	11.4
High school graduate	63	60.0
Partial college, technical training	20	19.0
College graduate	<u>8</u>	<u>7.6</u>
Mean educational level of wives = 12.1 years	105	99.9
Education of Husband		
Eighth grade or less	4	3.8
Partial high school	17	16.2
High school graduate	58	55.2
Partial college, technical training	14	13.3
College graduate	8	7.6
M.S., Ph.D., or professional degree	<u>4</u>	<u>3.8</u>
Mean educational level of husbands = 12.2 years	105	99.9

Table 2 (Continued)

Characteristics	n	Percent
Race		
White	85	81.0
Non-white	20	19.0
	<u>105</u>	<u>100.0</u>
Family Income		
Less than \$5,000	3	2.9
\$5,000 - \$7,499	3	2.9
\$7,500 - \$9,999	6	5.7
\$10,000-\$12,499	18	17.1
\$12,500-\$14,999	21	20.0
\$15,000-\$19,999	29	27.6
\$20,000-\$24,999	11	10.5
\$25,000-\$49,999	10	9.5
\$50,000+	4	3.8
Mean family income = \$18,550	105	100.0
Median family income = \$16,603		
Wife's Actual Wage Rate		
None	73	69.5
\$1.00 - \$1.99	2	1.9
\$2.00 - \$2.99	8	7.6
\$3.00 - \$3.99	9	8.6
\$4.00 - \$4.99	5	4.8
\$5.00+	8	7.6
	<u>105</u>	<u>100.0</u>
Mean wife's wage rate (excluding non-employed) = \$4.04		
Husband's Wage Rate		
None - \$1.99	3	2.9
\$2.00 - \$3.99	12	11.4
\$4.00 - \$5.99	33	31.4
\$6.00 - \$7.99	25	23.8
\$8.00 - \$9.99	17	16.2
\$10.00+	15	14.3
	<u>105</u>	<u>100.0</u>
Mean husband's wage rate = \$6.66		

*n = 105

¹Totals may not add to 100.0 percent because of rounding.

13 percent reported incomes of over \$25,000. The remaining 75 percent reported an income between \$10,000 and \$25,000 with the modal category being \$15,000-19,999. The median family income was \$16,603. Although these income figures seem high compared to the mean income of all families for that period of time (1977), the special characteristics of these sample families, i.e., both spouses present, only two children, and the presence of a child under 18, make the reported income figures more appropriate.

Wives' actual wage rates ranged from \$1.00 an hour to \$10.00 an hour. Ten wives (9.5 percent) worked for wages below the minimum wage, while the modal wage was between \$3.00 and \$3.99 per hour. Eight wives (7.6 percent) reported wage rates of at least \$5.00 an hour. The mean actual wage rate of all employed wives (n=32) was \$4.04 per hour. Results for the potential wage rate of all wives will be reported later.

Husbands' mean wage was \$6.66 per hour with the range of wage rates being much wider (predictably) than that of the wives. Three husbands (2.9 percent), including one who was currently unemployed, reported wage rates of under \$2.00 per hour, while 15 husbands (14.3 percent) reported wage rates of at least \$10.00 per hour. The modal category was between \$4.00 and \$5.99 per hour.

Descriptive Results of Time Allocation of Husbands and Wives

Presented in Table 3 are the descriptive data for husbands' time inputs for Day 1. Several results are strikingly apparent. First,

Table 3
 Descriptive Data on Husbands' Time Inputs Into
 Household Production - Day 1

Time Inputs	HP ¹		FP		MKMT		HYCP		CC		FC	
	n	%	n	%	n	%	n	%	n	%	n	%
None	44	41.9	82	78.1	86	81.9	75	71.4	99	94.3	81	77.1
1 - 30 minutes	18	17.1	14	13.3	8	7.6	11	10.5	4	3.8	13	12.4
31 - 60 minutes	11	10.5	2	1.9	4	3.8	6	5.7	1	1.0	4	3.8
61 - 120 minutes	14	13.3	4	3.8	1	1.0	6	5.7	1	1.0	5	4.8
120+ minutes	18	17.1	3	2.9	6	5.7	7	6.7	0	0.0	2	1.9
Mean Minutes	70		11		21		24		2		11	
Standard Deviation	121		33		71		60		10		29	
Coefficient of Variation	1.7		3.0		3.4		2.5		5.0		2.6	
Maximum (in Minutes)	645		180		420		395		90		175	
(in Hours)	10.75		3		7		6.6		1.5		2.9	

¹HP = All household production; FP = Food preparation and clean-up; MKMT = Marketing and management; HYCP = Home, yard, car, and pet care; CC = Clothing care and construction; FC = Family care.

although only about 40 percent of the husbands did no household work at all, a great majority of the husbands, ranging from 71.4 percent to 94.3 percent, contributed no time in each of the components of household production when analyzed separately. Secondly, as expected, husbands spent the most time in the traditionally masculine-stereotyped activities, home, yard, car, and pet care ($\bar{X} = 24$ minutes) and marketing and management ($\bar{X} = 21$ minutes) and the least time in feminine-stereotyped activities, clothing care and construction ($\bar{X} = 2$ minutes). Husbands' time inputs into food preparation and clean-up and all family care averaged about 11 minutes each. Husbands' mean time inputs into all household production was 70 minutes (1.2 hours) for Day 1.

However, there were some (albeit few) husbands who spent considerable amounts of time in household work activities, as shown both by the frequencies and the maximum values for the household work components. Eighteen husbands spent more than two hours in all household production while another 14 spent between one and two hours. The greatest amount of time spent by any husband in all household work was 10.75 hours.

The time allocation results for Day 2, presented in Table 4, show similar overall patterns with husbands spending slightly more time in each activity, except clothing care and construction for which almost no husbands contributed time. Husbands' mean time inputs into household production for Day 2 was 90 minutes (1.5 hours). Again, their contributions to household production were mainly in home, yard, car, and pet care ($\bar{X} = 37$ minutes) and marketing and management ($\bar{X} = 26$ minutes). Their time inputs into family care ($\bar{X} = 15$ minutes) and into

Table 4
 Descriptive Data on Husbands' Time Inputs Into
 Household Production - Day 2

Time Inputs	HP ¹		FP		MKMT		HYCP		CC		FC	
	n	%	n	%	n	%	n	%	n	%	n	%
None	46	43.8	82	78.1	88	83.8	71	67.6	103	98.1	76	72.4
1 - 30 minutes	10	9.5	14	13.3	8	7.6	9	8.6	2	1.9	14	13.3
31 - 60 minutes	12	11.4	3	2.9	2	1.9	12	11.4	0	0.0	7	6.7
61 - 120 minutes	16	15.2	3	2.9	0	0.0	4	3.8	0	0.0	6	5.7
120+ minutes	21	20.0	3	2.9	7	6.7	9	8.6	0	0.0	2	1.9
Mean minutes	90		12		26		37		0.4		15	
Standard deviation	156		36		87		92		3		35	
Coefficient of variation	1.7		3.0		3.3		2.5		7.5		2.3	
Maximum (in minutes)	660		250		540		630		30		220	
(in hours)	11		4.2		9		10.5		0.5		3.7	

¹Notation identical to Table 3.

food preparation and clean-up ($\bar{X} = 12$ minutes) slightly exceeded their contributions for Day 1. Again, husbands spent almost no time at all in clothing care and construction ($\bar{X} = .4$ minutes).

For Day 2, over 35 percent of the husbands spent at least an hour in all household production activities with over half of those (20 percent) spending two or more hours in all household work. Again, most of those husbands spent most of their time in the role-stereotyped activities, home, yard, car, and pet care and marketing and management. The maximum amount of time spent by any husband during Day 2 for all household work was 11 hours.

Wives' time inputs into household production for Day 1, presented in Table 5, exceeded those of husbands for every category and for total household production. The mean time of all wives in household production of 391 minutes (6.5 hours) was five times as great as the mean for husbands. The modal category of time inputs for wives for all household production was 4+ hours and the maximum time spent by any wife was 14.1 hours.

Wives spent the most time in food preparation and clean-up ($\bar{X} = 116$ minutes) and in family care ($\bar{X} = 88$ minutes). They averaged another hour and a quarter in home, yard, car, and pet care ($\bar{X} = 77$ minutes) and another hour in marketing and management activities ($\bar{X} = 59$ minutes). The least time-consuming activity for wives, as was the case for husbands, was clothing care and construction in which they spent an average of 51 minutes for Day 1. As evident from the maximum time inputs shown, some wives spent a great amount of time in

Table 5
 Descriptive Data on Wives' Time Inputs Into
 Household Production - Day 1

Time Inputs	HP ¹		FP		MKMT		HYCP		CC		FC	
	n	%	n	%	n	%	n	%	n	%	n	%
None	0	0.0	2	1.9	52	49.5	14	13.3	36	34.3	23	21.9
1 - 30 minutes	2	1.9	11	10.5	13	12.4	28	26.7	21	20.0	21	20.0
31 - 60 minutes	2	1.9	18	17.1	17	16.2	18	17.1	22	21.0	13	12.4
61 - 120 minutes	7	6.7	35	33.3	6	5.7	24	22.9	15	14.3	20	19.0
121 - 180 minutes	11	10.5	21	20.0	6	5.7	11	10.5	5	4.8	13	12.4
181 - 240 minutes	8	7.6	12	11.4	2	1.9	4	3.8	2	1.9	7	6.7
240+ minutes	75	71.4	6	5.7	9	8.6	6	5.7	4	3.8	8	7.6
Mean minutes	391		116		59		77		51		88	
Standard deviation	205		85		105		86		74		106	
Coefficient of variation	0.5		0.7		1.8		1.1		1.5		1.2	
Maximum (in minutes)	845		590		420		490		355		445	
(in hours)	14.1		9.8		7		8.2		5.9		7.4	

¹Notation identical to Table 3.

the component activities of household production, ranging from a maximum of 5.9 hours a day in clothing care and construction to 9.8 hours per day in food preparation and clean-up. Examination of the actual time records indicates that these and other large blocks of time were spent in activities that are not habitual, daily chores; rather they are sporadic but time-consuming activities such as home canning, clothing construction, and extensive housecleaning.

Very few wives, unlike husbands, spent no time in some of the household production tasks. Only four wives spent one hour or less in household production: only two did no food preparation or clean-up at all. More wives did no marketing and management ($n=52$) or no clothing care ($n=36$) than some of the other tasks, indicating that, perhaps, these categories of household work are those for which daily inputs are not necessary, even by wives. While almost a quarter of the wives ($n=23$) reported no time in family care, closer examination of these wives indicated that they were mothers of older children who generally required less parental time than younger children.

The time allocation results for wives for Day 2, presented in Table 6, were generally similar to those for Day 1. Similar to the comparison for husbands, wives spent slightly more time in all household production ($\bar{X} = 401$ minutes or 6.6 hours) during Day 2. The distribution of time within the household production component categories was similar, except less time was spent in marketing and management ($\bar{X} = 28$ minutes) during Day 2. Again, the most time-intensive activities for wives were food preparation and clean-up ($\bar{X} = 125$ minutes) and home, yard, car, and pet care ($\bar{X} = 103$ minutes) and the least

Table 6
 Descriptive Data on Wives' Time Inputs Into
 Household Production - Day 2

Time Inputs	HP ¹		FP		MKMT		HYCP		CC		FC	
	n	%	n	%	n	%	n	%	n	%	n	%
None	1	1.0	1	1.0	48	45.7	15	14.3	48	45.7	36	34.3
1 - 30 minutes	0	0.0	8	7.6	12	11.4	14	13.3	14	13.3	15	14.3
31 - 60 minutes	1	1.0	13	12.4	13	12.4	22	21.0	18	17.1	19	18.1
61 - 120 minutes	7	6.7	38	36.2	12	11.4	21	20.0	17	16.2	12	11.4
121 - 180 minutes	7	6.7	23	21.9	7	6.7	15	14.3	5	4.8	12	11.4
181 - 240 minutes	14	13.3	16	15.2	7	6.7	10	9.5	2	1.9	4	3.8
240+ minutes	75	71.4	6	5.7	6	5.7	8	7.6	1	1.0	7	6.7
Mean minutes	401		125		28		103		41		69	
Standard deviation	205		74		80		109		59		88	
Coefficient of variation	0.5		0.6		2.9		1.1		1.4		1.3	
Maximum (in minutes)	1030		450		360		630		330		360	
(in hours)	17.2		7.5		6		10.5		5.5		6	

¹Notation identical to Table 3.

time-intensive activity was marketing and management ($\bar{X} = 28$ minutes). Wives' time inputs into family care for Day 2 were lower ($\bar{X} = 69$ minutes) than for Day 1. In fact, only in home, yard, car and pet care did wives spend, on the average, more time during Day 2 than during Day 1.

Again, few wives spent absolutely no time in some of the household production activities. Only one wife spent no time in food preparation and 15 did no home, yard, car or pet care. More wives ($n=36$) spent no time at all in family care. Almost half of the wives spent no time in marketing and management ($n=48$) and in clothing care and construction ($n=48$), again indicating that these activities were less regular than some of the other chores. For Day 2, only two wives did no household production at all and the great majority spent at least four hours in all household production tasks.

The coefficients of variation (defined as the standard error divided by the mean) found in Tables 3-6, which are standardized (i.e., unitless) measures of variability in the individuals' time use, confirms the sporadic nature of some of the tasks (i.e., they may be done in "lumps" rather than on a regular daily basis). Those activities for which there was a high coefficient of variation (food preparation, marketing and management and clothing care for men and home, yard, car, and pet care for women) are those for which the variation in time use for those activities for this sample on these interview days was highest.

Presented in Table 7 is a comparison of the mean values of several different forms of the time allocation variables for both husbands and

Table 7

Comparison of Different Forms of Time

Allocation Variables

	Daily Records (n=105)				Weekly Estimates (n=60)				HH&K (n=350) ¹
	Day 1		Day 2		Per Week		Per Day		Hrs. per week
	Min.	Hr.	Min.	Hr.	Min.	Hr.	Min.	Hr.	
HUSBANDS	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Household Production	70	1.17	90	1.50	976.67	16.28	139.52	2.33	10.60
FP	11		12		157.92	2.63	22.56	0.38	1.22
MKMT	21		26		319.17	5.32	45.60	0.76	1.38
HYCP	24		37		339.17	5.65	48.45	0.81	1.04
CC	2		0		17.50	0.29	2.50	0.04	0.29
FC	11		15		142.92	2.38	20.42	0.34	2.65 ²
									4.02 ²
Market Work	508	8.47	441	7.35	4007.50	66.79	572.50	9.54	43.18
Leisure	862	14.37	909	15.15	5095.83	84.93	727.98	12.13	114.22
	<u>1440</u>		<u>1440</u>		<u>10080.00</u>	<u>168.00</u>	<u>1440.00</u>	<u>24.00</u>	<u>168.00</u>
WIVES									
Household Production	391	6.52	401	6.68	3638.75	60.65	519.82	8.66	43.49
FP	116		125		1149.17	19.15	164.17	2.74	11.39
MKMT	59		28		585.83	9.76	83.69	1.39	3.69
HYCP	77		103		789.17	13.15	112.74	1.88	8.56
CC	51		41		399.58	6.66	57.08	0.95	3.96
FC	88		69		715.00	11.92	102.14	1.70	13.70 ²
									2.19 ²
Market Work	112	1.87	103	1.72	907.92	15.13	129.70	2.16	21.15
Leisure	937	15.62	936	15.62	5533.33	92.22	790.48	13.17	103.36
	<u>1440</u>		<u>1440</u>		<u>10080.00</u>	<u>168.00</u>	<u>1440.00</u>	<u>24.00</u>	<u>168.00</u>

¹ For approximately 350 South Carolina families from Hill, Hunt, and Kiker, 1979.

² Other household production time.

wives. Columns (a) through (d) are abbreviated versions of the Day 1 and Day 2 time input tables presented here for ease of comparison. Columns (e) through (h) are the results of the weekly estimates for those spouses for whom time inputs were recorded for one weekday and one weekend day. Column (e) contains the mean minutes per week in various categories of time use, which are the values which were used in the estimation of the model. Column (f) includes the mean hours per week of time inputs, which can be compared to the results presented by Hill et al. (1979) in column (i). Column (g) contains the average minutes per day of the sample for whom the weekly time estimates were derived (column (e) divided by seven) and column (h) is the mean hours per day for the same sample (column (g) divided by 60).

Several comparisons provide interesting results. First, the estimation procedure for obtaining the weekly estimates of time inputs for husbands and wives overestimated spouses' time inputs into household production activities and market work for both spouses. A comparison of columns (a), (c), and (g) reveals, for example, that whereas husbands averaged 70 and 90 minutes in household production for Day 1 and Day 2, respectively, the estimated daily time inputs derived from the estimation procedure yielded a mean of about 140 minutes in household production for husbands.

Because the estimation procedure assumes that each record day is a random day which accurately represents all other days of its type, i.e., a Saturday is a typical weekend day and a Tuesday is a typical weekday, it overrepresents or underrepresents some activities which were actually recorded. Those activities for which we have the least

confidence in the weekly estimated times are those activities which are less regular, more sporadic in nature. Recall that these activities (FP, MKMT, CC for husbands and HYCP for wives) are those which have the largest coefficients of variation. But, as long as the estimates of particular spouses are not over- or under-estimated more than those of other spouses, this merely represents "noise" in the dependent variables to be used in the model and does not bias the estimated coefficients.

Secondly, comparing columns (f) and (i) reveals that, again, the weekly estimates for the present sample are greater for household production and for market work than are the self-report results for the Hill et al. (1979) South Carolina sample. Although it may be argued that the weekly recall reports of the South Carolina sample underestimate the productive work efforts of the spouses (compared to the present estimates), it is indeterminate which set of estimates is more accurate. Again, this causes no bias in the weekly estimates used here as long as the effect of the estimation procedure is the same for all spouses in the present sample.

Table 8 includes the means and standard deviations of the exogenous variables to be used in the estimation of the model. Recall that column (e) of Table 7 shows the means for the time input variables of the model. Comparison of the mean values of the exogenous variables for the weekly estimate sample (n=60) reveals that these results are not substantively different from those for the larger sample for spouses' age, education, income, and husbands' wage rate. As expected,

Table 8
Descriptive Data for Exogenous Variables
Used in the Model

Variable	\bar{X}	SD
Husbands' Wage (W_h)	\$ 6.33	3.03
Wives' Predicted Wage (W_w)	\$ 3.02	0.46
Family Income (Y)	\$ 18,237.50	\$ 11,298.38
Husbands' education (E_h)	12.37	2.10
Wives' education (E_w)	12.28	1.32
Husbands' Age (A_h)	34.90	8.18
Wives' Age (A_w)	32.23	7.31
Age of Youngest Child (AYC)	6.08	5.27
Husbands' Attitudes Toward Sex Roles (AT_h)	3.22	0.49
Wives' Attitudes Toward Sex Roles (AT_w)	3.49	0.50
Husbands' Interest in Home Production (IN_h)	77.49	18.06
Wives' Interests in Home Production (IN_w)	87.20	14.16
Husbands' Competence in Home Production (CP_h)	35.40	8.09
Wives' Competence in Home Production (CP_w)	37.67	6.23
Season of the Year (1=Non-summer)	0.33	----
Situational Factors (1=Yes)	0.28	----

wives' potential market wage rate averaged \$3.02, compared to the observed mean wage rate of \$4.04 for all employed wives. Not only are these means computed from different samples but the higher wage rate for employed wives may be due to self-selection; that is, wives with higher predicted wage rates than normal would be more likely to be employed in the labor market and vice versa.

As expected, wives' attitude scores, their interest scores, and their competence scores were higher than those of husbands, indicating that wives were more supportive of feminist attitudes which avowed an equalitarian division of labor between spouses and that wives perceived themselves as more interested in and competent at household production tasks than husbands. The substantive differences between husbands and wives were relatively small for their attitudes toward sex roles and their reported competence at household tasks. However, larger differences appeared between husbands' and wives' scores on the interest scale, indicating that these variables may capture more widely varying differences in tastes between husbands. None of these observations imply the independence of these tastes effects from the productivity effects; indeed, it may be argued that higher interest and competence scores may reflect differences in productivity and/or time allocation patterns between the spouses.

As mandated by the sampling plan, one third of the sample recorded their time inputs for days during the summer, while the remaining two-thirds reported their time use for non-summer days. The mean value of the dummy variable for situational factors of 0.28 indicates that 28

percent of the sample reported the existence of some meteorological or physiological factor that affected their time allocation on the sample day(s). All of the recorded meteorological and physiological factors, when examined, were found to be constraints on market work time; the effects of these factors on the allocation of time between household production activities and leisure were indeterminate a priori.

Results for Husbands' Time Inputs Into
Household Production, Market Work,
And Leisure

Ordinary Least Squares (OLS)
Hierarchical Regression

Presented in Table 9 are the results of the estimates for husbands' time inputs into household production, using hierarchical inclusion of the exogenous variables in an ordinary least squares (OLS) regression model with the weekly estimates of husbands' time inputs (n=60). Recall that in these OLS estimates, inclusion of the observed time inputs of the wives in household work involves simultaneity bias, which may bias the coefficients and will be dealt with in later sections. Because of this possibility, only a general discussion of these results is included here.

The first set of exogenous variables, the situational variables, season of the year and the existence of meteorological and/or physiological factors constraining time use, are entered as control variables and are never significantly related to husbands' time in household production. In equation (1) when the economic variables, husbands'

Table 9

OLS Estimates of Factors Related to Husbands' Time

Inputs Into Household Production:

Weekly Estimates

Variable	Equations:				
	(1)	(2)	(3)	Beta	t
	b/(SE)	b/(SE)	b/(SE)		
Season (Summer)	-18.39 (309.89)	-107.91 (297.38)	-52.96 (256.96)	-.02	0.20
Situational Factors (Yes)	501.64 (320.89)	157.79 (314.51)	52.17 (272.59)	.02	0.20
Husbands' Wage Rate	-102.06* (52.43)	-111.10** (48.41)	-76.14* (42.61)	-.21	1.79
Family Income	0.02* (0.01)	0.03** (0.01)	0.03** (0.01)	.26	2.22
Wives' HP	0.18* (0.09)	0.18** (0.08)	0.28** (0.08)	.42	3.70
Husbands' Education		14.33 (68.33)	-10.79 (59.27)	-.02	0.17
Husbands' Age		32.57 (27.79)	21.17 (24.13)	.15	0.88
Husbands' Competence		-2.97 (18.13)	1.84 (15.69)	.01	0.10
Husbands' Attitudes		28.74 (272.74)	160.96 (237.48)	.07	0.68
Husbands' Interests		29.17** (7.99)	30.18** (6.90)	.49	19.16
Age of Youngest Child		-52.74 (42.73)	-4.44 (38.64)	-.02	0.10
Husbands' Labor Market Time			-0.19** (0.05)	-.48	4.18
CONSTANT	413.75	-2743.20	-2766.97		
R ²	.150	.385	.552		
F	1.90	2.73*	4.82**		
SEE	1074.38	969.05	836.25		

*Significant at .10 level

**Significant at .05 level.

wage rates, family income, and wives' time inputs into household production, are entered separately from the additional productivity and taste variables, each variable was significantly related to husbands' household production time in a plausible direction. However, the overall equation with these two sets of variables was not statistically significant ($F = 1.90$) and the R^2 of .15 indicates that a relatively small percentage of the variability in husbands' time allocation was explained.

In equation (2), when the additional productivity and taste variables are included as exogenous variables, the economic factors again exhibit significant effects in the same directions; only small differences in the magnitude of the regression coefficients associated with the economic variables were estimated. However, one of the taste variables, husbands' interests in household production, was significantly related to husbands' time in home production. Further, the overall equation was statistically significant in explaining much greater proportion of the variability ($R^2 = .385$) in husbands' time allocation to household work. The standard error of the estimate was reduced from that of equation (1) by over 100 minutes. Improved predictive power was definitely gained by the inclusion of the additional set of productivity and taste variables as exogenous variables.

The wage effect on husbands' household production time is negative, as expected, which concurs with all previous findings for the price effect on an individual's time allocation (Bloch, 1973; Nickols & Metzen, 1978; Hill et al., 1979). This indicates that increases in

the wage rate raised the shadow price of household production time and reduced the husbands' time inputs into household work, which is then relatively more costly. In addition, family income is positively related to husbands' time in home production. This may mean that, as a group, those home-produced commodities for which husbands contribute their time are analogous to normal goods, those for which demand increases as income rises. It definitely indicates that for this sample the income elasticity for home commodities is greater than income elasticity for leisure of husbands. Thus, when family income increases, rather than spending more time in leisure (definitely a normal good), husbands increase their household production time. Differences in the income effect on husbands' time inputs into specific categories of household production will be discussed later.

Wives' time in all household production is positively related to husbands' household production time, indicating that, in general, spouses' time inputs are complementary. As wives' time in household tasks increases so does husbands', although this increase is not one for one. Husbands' time inputs increase only a small fraction of an hour for every additional hour contributed by wives.

Of the additional productivity and taste variables, only husbands' interests in household production tasks are significantly related to their household production, although the direction of the relationships estimated for the other productivity and taste variables are generally plausible. The expected positive relationship between interests and time inputs is substantiated; that is, husbands reporting higher interest in and motivation for household production tasks spend more time in those activities.

If one were interested primarily in the predictions of an unknown husband's time allocation to household production, equation (3) is useful. The directions of the estimated effects are identical except for that associated with husbands' education, which was never statistically significant. The magnitude of the coefficients remain relatively stable between equations (2) and (3). The inclusion of husbands' observed labor market work time (clearly endogenous) in this equation involves, again, simultaneity bias (because the decision of an individual to spend time in the two activities is conceptually simultaneous), yet it yields some interesting results, particularly if the goal of the analysis is to produce an equation which best predicts husbands' household production time.

The effect of husbands' labor market work is statistically significant and, as expected, negative. For every extra hour husbands spend in the labor market, they reduce their time in household production by about 11 minutes. In fact, examination of the Beta weights (standardized regression coefficients) reveals that husbands' labor market work time ($\beta = -.48$) was one of the factors, along with their interests ($\beta = .49$), to which their time in household work was most responsive. Wives' time inputs into household production were next most important ($\beta = .42$) in explaining differences in husbands' time allocation and family income ($\beta = .26$) and husbands' wage rates ($\beta = -.21$) were relatively less important as factors affecting husbands' time use for household production.

The final equation explained over half ($R^2 = .552$) of the total variability in husbands' household production, a significant

proportion of that variability ($F = 4.82$). Again, this represents a substantial increase over the R^2 of both equations (1) and (2). The standard error of the estimate was also reduced over 130 minutes to 836.25, which is still, however, not a low prediction error considering the mean husbands' time allocation of 976.67 minutes.

In summary, the inclusion of the husbands' labor market work as an observed variable produced a "better" equation for predictive purposes in estimating husbands' household production time allocation. Generally, the reported relationships confirm findings of previous studies, including Bloch (1973), Nickols and Metzen (1978), Hill et al., (1979) and Sanik (1979), although in this study a much higher proportion of the variability in husbands' time inputs was explained. Additional exogenous variables were also included here for which no comparisons were possible. However, as mentioned previously, simultaneity bias in the estimation of the coefficients was caused by the inclusion of both the wives' household production time and the market work time of husbands as exogenous variables in these OLS equations, when, in fact, these two factors are simultaneously determined within the family time allocation system. Thus, further work is necessary to investigate the possible effects of this bias.

2SLS/3SLS Systems Regression

The results for the 2SLS/3SLS estimates for the household production, market work, and leisure time inputs of husbands are presented in Table 10. Included also for comparison are the OLS results for each equation taken from column (2) in Table 9. Exogenous variables entered

Table 10

2SLS/3SLS Estimates for Husbands' HP, M, and L

Variable	Household Production			Market Work			Leisure		
	OLS	2SLS/3SLS		OLS	2SLS/3SLS		OLS	2SLS/3SLS	
	b	b	t	b	b	t	b	b	t
Husbands' Wage	-111.10**	-58.86	-1.02	178.84	189.80	1.25	-138.16	-130.94	-0.98
Family Income	0.03**	0.018	1.12	-0.02	-0.013	-0.33	-0.001	-0.004	-0.11
Wives' HP	0.18**	0.27	1.26	----	0.45	0.81	----	-0.72	-1.46
Wives' M	----	0.54**	2.02	-0.27	0.04	0.06	----	-0.58	-0.93
Wives' L	----	----	----	----	----	----	0.59**	----	----
Husbands' Education	14.33	-58.19	-0.71	-136.91	-142.77	-0.66	213.90	200.96	1.05
Husbands' Age	32.57	27.15	0.93	-46.30	-58.41	-0.75	28.58	31.26	0.46
Husbands' Competence	-2.97	-21.11	-0.99	45.09	25.37	0.45	-6.73	-4.25	-0.09
Husbands' Attitudes	28.74	277.29	0.90	548.13	706.58	0.86	-984.96	-983.88	-1.37
Husbands' Interests	29.17**	17.95*	1.77	7.30	3.93	0.15	-20.65	-21.88	-0.93
Age of Youngest Child	-52.74	-86.57*	-1.68	222.68*	242.96*	1.79	-143.16	-156.39	-1.31
Season	-107.91	-320.14	-0.93	142.04	234.38	0.26	157.85	85.75	0.11
Situational Factors	157.79	307.91	0.90	-799.10	-565.76	-0.63	300.23	257.85	0.32
CONSTANT	-2743.20	-1642.99	-0.90	-1648.64	298.36	0.06	4804.77	11424.63**	2.70
R ²	.385	.377		.198	.209		.314	.256	
F	2.73**	2.37**		1.07	1.03		1.99**	1.35	

*Significant at .10 level

**Significant at .05 level

into each equation are identical, including the predicted values of wives' time inputs into household production and labor market work. Obviously, because the three wives' time inputs values are linearly related (that is, they sum to a constant, 10080 minutes/week) all three cannot be entered as exogenous variables in the husbands' time use equations. However, because of this known relationship, the effects of changes in wives' leisure can also be determined in a manner similar to the interpretation of coefficients for dummy variables. Because the wives' leisure (analogous to the omitted category of a dummy variable) is a systematic component of the intercept term, the effect of a change in wives' time from household production to leisure, for example, can be interpolated.

Several technical notes are in order. First, note that in the systems equations method, the coefficients for each exogenous variable in the three equations sum to zero and the intercept term add to 10080 minutes. Resulting from the mathematics of the model, this simply means that a change in any exogenous variable which affects husbands' time use in one activity will create an opposite change in the sum of the other two activities.

Secondly, some of the effects which were statistically significant in the OLS estimation are not significant in the systems estimation results, most notably in the husbands' household production equation. Although the signs of the coefficients remain unchanged, the effects of husbands' wage rates, family income, and wives' household production time become statistically no different from zero in the systems equation method. In the husbands' leisure equation, a similar situation

occurs, although since the intercept term contains as a systematic component the wives' time in leisure, the statistical significance of the constant in the 2SLS/3SLS results probably replaces the significance of the wives' leisure effect in the OLS results. Generally, also, the direction of the effects of the other factors remains unchanged, although the magnitudes of the changes, in some cases, are quite large. The coefficients of determination, although not strictly comparable across the estimation procedures, are generally similar; the only increase in the R^2 's occurs in the husbands' market work equation.

Concerning substantive results, in the husbands' household production equation, significant positive effects were found for husbands' interests in household production and for wives' time in market work. Husbands who expressed more interest in household production spent more time in household work. As wives increased their market work time, husbands' time in home production increased, as expected, although again the relationship is not one for one. A significant negative relationship between husbands' home production time and the age of the youngest child was found. Children tend to increase the demand for home-produced commodities involving them and increase the marginal value of household outputs (Hill et al., 1979). Here, the younger the child present in the home, the greater the relative productivity of husbands' time in household production tasks.

The only factor which was statistically significant in the husbands' market work equation was the age of the youngest child, which was positively related to husbands' market work time inputs. Older

children may be substitutes for the husband in home production tasks, as they tend to decrease husbands' time in those tasks. They may also require more goods-intensive market goods and services such that more monetary income derived from market work is desired. Although not statistically significant, the coefficients of the economic variables in the market work equation are generally in the expected directions. The negative coefficients for both husbands' age and education are somewhat puzzling, since, for this sample, both should be positively related to market work time. The occupational categories of the sample husbands, however, reveal that many of the men are employed in occupations in which productivity is enhanced not so much by formal education as by on-the-job training and experience, which is not totally captured by the included variables. In any case, these effects are not statistically significant here.

For husbands' time inputs into leisure, the only statistically significant effect is for the intercept term, which can be considered to represent wives' time in leisure. Thus, husbands' and wives' time in leisure can be considered complementary goods; when the leisure of one spouse increases, so does the other's, although this time in leisure is not necessarily spent together. Here, also, some of the effects, though not significant, are revealed to be in the opposite direction from expected, i.e., the negative coefficients for income, which was predicted to be unambiguously positive. This may be due to measurement error because of the contamination of the family income variable which included the husbands' income derived from market work.

A closer examination of the relationships between husbands' and wives' time inputs into all three types of activities--household production, market work, and leisure--is possible in Table 11. Recall that the omission of one of the wives' time input variables (leisure) in the systems methods allows the interpretation of the effect of the other two wives' time variables on the husbands' time use in a manner similar to the interpretation of dummy variable categories when compared to the omitted category. So, for example, when wives shift one hour of time from leisure to household production, husbands' time in household production increases by .265 of an hour per week (about 16 minutes); the time in market work spent by husbands increases by .453 of an hour per week (about 27 minutes). These shifts in husbands' time must come at the expense of their time in leisure, which decreases by .718 of an hour per week (about 43 minutes). If, however, wives shift an hour of time from leisure to market work, husbands' time in household production increases by .539 of an hour (about 32 minutes).

In a more complicated case, a shift of an hour by wives from household production to market work results in an increase by husbands of .274 of an hour (again, about 16 minutes) in household production time (the difference between .539 and .265). Stated differently, this indicates, for example, that husbands of wives who worked 15 hours per week in the labor market (instead of spending that time in household production), spent about 16 minutes per week more in household work than did husbands of wives who were employed 14 hours per week. More practically, husbands whose wives worked part-time (15 hours per week) spent about four hours more per week in household work than did husbands whose wives were not employed in the labor market.

Table 11
Elasticities of Substitution Between Time Inputs
Of Husbands and Wives

Shift in Wives' Time Inputs		Husbands' Time Inputs					
From	To	Household Production		Market Work		Leisure	
		<u>b</u>	ϵ^1	<u>b</u>	ϵ	<u>b</u>	ϵ
Household Production	Market Work	+0.274	+1.021	-0.412	-0.374	+0.138	+0.099
Household Production	Leisure	-0.265	-0.987	-0.453	-0.411	+0.718	+0.513
Market Work	Household Production	-0.274	-0.255	+0.412	+0.093	-0.138	-0.025
Market Work	Leisure	-0.539	-0.501	-0.041	-0.009	+0.579	+0.103
Leisure	Household Production	+0.265	+1.501	+0.453	+0.625	-0.718	-0.780
Leisure	Market Work	+0.539	+3.054	+0.041	+0.057	-0.579	-0.629

¹ ϵ is elasticity, evaluated at the means:

$$\epsilon = \frac{\partial y}{\partial x} \cdot \frac{\bar{x}}{\bar{y}} \quad \text{or} \quad b \cdot \frac{\bar{x}}{\bar{y}}$$

Results for Husbands' Time Inputs Into
Components of Household Production

The results of OLS and 3SLS regressions for husbands' time inputs into the five components of household production are presented in Tables 12-16. First, the results of each set of regression for each component activity are discussed; then, a discussion of the different effects of each factor on husbands' time use in the various activities are presented. Observed differences in the results obtained via different estimation procedures are noted as are substantive results concerning the relationships hypothesized by the model.

The factors related to husbands' time in food preparation and clean-up are presented in Table 12. The effects are generally similar across estimation techniques; that is, the same factors are statistically significant except for the effect of wives' household production time on their husbands' time, which is significant in the OLS results but not significant using the 3SLS procedure. This effect, as estimated, is quantitatively small; as wives' time in all household production decreased an hour, husbands' contribution to food preparation activities increased about three minutes, which indicates that spouses' time inputs are substitutes, albeit weak ones, for each other. Husbands' food preparation also increased with a decrease in the age of the youngest child, yet it increased with his own age. It appears that the demand for home-produced food commodities associated with young children increases the time inputs of fathers rather substantially. As the youngest child's age increased one year, the father's

Table 12
 Factors Related to Husbands' Time Inputs Into
 Food Preparation and Clean-up

Variable	Equations:	(1) OLS ^a	(2) OLS	(3) 3SLS
		b (t)	b (t)	b (t)
Husbands' Wage		-23.91 (-1.57)	-21.47 (-1.45)	-21.44 (-1.43)
Family Income		-0.0007 (-0.16)	-0.0019 (-0.48)	-0.0020 (-0.46)
Wives' Time Inputs Into Household Production		----	-0.05** (-2.04)	-0.05 (-0.87)
Husbands' Education		33.05 (1.54)	28.44 (1.36)	28.39 (1.32)
Husbands' Age		25.31*** (2.90)	26.48*** (3.12)	26.49*** (3.09)
Husbands' Competence		-0.50 (-0.09)	0.71 (0.13)	0.72 (0.13)
Husbands' Attitudes		-6.80 (-0.08)	-8.88 (-0.11)	-8.91 (-0.11)
Husbands' Interests		1.42 (0.57)	1.03 (0.42)	1.03 (0.41)
Age of Youngest Child		-25.93* (-1.96)	-31.06** (-21.38)	-31.12** (-2.20)
Season		-89.84 (-0.97)	-117.46 (-1.29)	-117.81 (-1.23)
Situational Factors		135.71 (1.37)	116.68 (1.21)	116.44 (1.19)
CONSTANT		-892.43	-636.70	-633.51
R ²		.391***	.440**	.416***
F		3.14	3.42	3.11

^aColumn (1) is OLS without wives' time entered; Column (2) is OLS with wives' time entered.

*p < .10

**p < .05

***p < .01

Table 13
Factors Related to Husbands' Time Inputs Into
Marketing and Management

Variable	Equations:	(1) OLS ^a	(2) OLS	(3) 3SLS
		b (t)	b (t)	b (t)
Husbands' Wage		-57.89* (-1.82)	-63.26** (-2.06)	-64.73** (-2.07)
Family Income		0.022** (2.53)	0.025*** (2.93)	0.026*** (2.85)
Wives' Time Inputs Into Household Production		----	0.12** (2.16)	0.15 (1.15)
Husbands' Education		-57.45 (-1.29)	-47.35 (-1.09)	-44.58 (-1.00)
Husbands' Age		10.68 (0.59)	8.12 (0.46)	7.42 (0.42)
Husbands' Competence		-8.40 (-0.71)	-11.05 (-0.96)	-11.77 (-0.99)
Husbands' Attitudes		36.26 (0.20)	40.83 (0.24)	42.08 (0.24)
Husbands' Interests		11.93** (2.28)	12.79** (2.52)	13.03** (2.52)
Age of Youngest Child		-14.83 (-0.54)	-3.59 (-0.13)	-0.51 (-0.02)
Season		4.34 (0.02)	64.92 (0.34)	81.54 (0.41)
Situational Factors		-23.20 (-0.11)	18.54 (0.09)	30.00 (0.15)
CONSTANT		-25.69	-586.61	-740.47
R ²		.237	.305*	.268
F		1.52	1.91	1.60

^aColumn (1) is OLS without wives' time entered; Column (2) is OLS with wives' time entered (simultaneity bias).

*p < .10

**p < .05

***p < .01

Table 14
 Factors Related to Husbands' Time Inputs Into
 Home, Yard, Car, and Pet Care

Variable	Equations:	(1) OLS ^a	(2) OLS	(3) 3SLS
		b (t)	b (t)	b (t)
Husbands' Wage		-25.08 (-0.97)	-29.74 (-1.20)	-28.16 (-1.11)
Family Income		0.0014 (0.20)	0.0039 (0.57)	0.0031 (0.42)
Wives' Time Inputs Into Household Production		----	0.10** (2.32)	0.07 (0.64)
Husbands' Education		10.10 (0.28)	18.87 (0.54)	15.89 (0.44)
Husbands' Age		-4.05 (-0.27)	-6.27 (-0.44)	-5.52 (-0.38)
Husbands' Competence		4.47 (0.46)	2.17 (0.23)	2.95 (0.31)
Husbands' Attitudes		6.23 (0.04)	10.20 (0.07)	8.86 (0.06)
Husbands' Interests		11.70*** (2.75)	12.45*** (3.04)	12.19*** (2.92)
Age of Youngest Child		-2.06 (-0.09)	7.70 (0.35)	4.39 (0.18)
Season		-72.78 (-0.40)	-20.19 (-0.13)	-38.03 (-0.24)
Situational Factors		-6.90 (-0.04)	29.35 (0.18)	17.05 (0.10)
CONSTANT		-557.85	-1044.85	-879.69
R ²		.186	.268	.206
F		1.12	1.60	1.13

^aColumn (1) is OLS without wives' time entered; Column (2) is OLS with wives' time entered (simultaneity bias).

*p < .10

**p < .05

***p < .01

Table 15
 Factors Related to Husbands' Time Inputs Into
 Clothing Care and Construction

Variable	Equations:	(1) OLS ^a	(2) OLS	(3) 3SLS
		b (t)	b (t)	b (t)
Husbands' Wage		-3.33 (-1.00)	-2.85 (-0.87)	-3.22 (-0.95)
Family Income		0.0008 (0.91)	0.0006 (0.64)	0.0008 (0.80)
Wives' Time Inputs Into Household Production		-----	-0.01* (-1.81)	-0.002 (-0.16)
Husbands' Education		-5.01 (-1.07)	-5.91 (-1.28)	-5.21 (-1.08)
Husbands' Age		0.50 (0.26)	0.73 (0.39)	0.55 (0.28)
Husbands' Competence		-0.26 (-0.21)	-0.02 (-0.02)	-0.20 (-0.16)
Husbands' Attitudes		-2.00 (-0.11)	-2.41 (-0.13)	-2.09 (-0.11)
Husbands' Interests		0.64 (1.17)	0.56 (1.04)	0.62 (1.12)
Age of Youngest Child		-1.93 (-0.67)	-2.94 (-1.02)	-2.16 (-0.68)
Season		11.05 (0.55)	5.65 (0.28)	9.85 (0.40)
Situational Factors		28.41 (1.32)	24.69 (1.10)	27.59 (1.25)
CONSTANT		33.90	83.95	44.94
R ²		.152	.206	.155
F		0.88	1.13	0.80

^aColumn (1) is OLS without wives' time entered; Column (2) is OLS with wives' time entered (simultaneity bias).

*p < .10

**p < .05

***p < .01

Table 16
 Factors Related to Husbands' Time Inputs Into
 Family Care, Physical and Non-Physical

Variable	Equations:	(1) OLS ^a	(2) OLS	(3) 3SLS
		b (t)	b (t)	b (t)
Husbands' Wage		7.65 (0.64)	0.20 (0.52)	5.25 (0.43)
Family Income		-0.0003 (-0.10)	0.0004 (0.13)	0.0009 (0.27)
Wives' Time Inputs Into Household Production		----	0.03 (1.50)	0.05 (1.03)
Husbands' Education		17.55 (1.04)	20.28 (1.21)	22.08 (1.27)
Husbands' Age		4.19 (0.61)	3.51 (0.51)	3.05 (0.44)
Husbands' Competence		5.92 (1.32)	5.21 (1.17)	4.74 (1.02)
Husbands' Attitudes		-12.23 (-0.18)	-11.00 (-0.16)	-10.19 (-0.15)
Husbands' Interests		2.11 (1.06)	2.34 (1.19)	2.49 (1.24)
Age of Youngest Child		-25.88** (-2.48)	-22.85** (-2.17)	-20.85* (-1.81)
Season		-57.15 (-0.78)	-40.82 (-0.56)	-30.02 (-0.39)
Situational Factors		-42.71 (-0.55)	-31.46 (-0.41)	-24.02 (-0.30)
CONSTANT		-407.77	-558.99	-658.99
R ²		.301**	.333**	.317*
F		2.11	2.17	2.03

^aColumn (1) is OLS without wives' time entered; Column (2) is OLS with wives' time entered (simultaneity bias).

*p < .10

**p < .05

***p < .01

contributions for food preparation activities decreased about 20 minutes per week. So, for example, the difference in time inputs into food-related activities between a father of a one-year-old and a 15-year-old would be expected to be about five hours per week. The age effect is associated with on-the-job experience in household production activities, which increases husbands' productivity at food preparation tasks and reduces the time required to produce these commodities. The positive relationships between food preparation time and husbands' age indicates that these home-produced goods are cheaper to produce; thus, demand for them increases as the household's real income (resulting from productivity increases) rises (Hill et al., 1979, 7). The equation for husbands' food preparation time inputs accounted for about forty percent of their variability in time inputs, a statistically significant portion.

Presented in Table 13 are the results for husbands' time inputs into marketing and management activities. Again a substantial proportion of the variability in husbands' time inputs were explained by the model, although in the OLS technique a statistically significant portion, thirty percent, was explained, whereas the R^2 for the 3SLS procedure was not statistically significant. Again, the effect of wives' time inputs into household production were significant in the OLS model and not significant in the 3SLS procedure. For marketing and management activities husbands' and wives' time inputs were complementary; that is, as wives' time in these activities increased an hour, husbands' time inputs also increased, but by a lesser amount, about eight or nine minutes.

The coefficients of husbands' wage rates and family income were statistically significant and behaved as expected. Because the price of husbands' time increases with a wage increase, they reduce their time in marketing and management activities by about 39 minutes per week for every dollar increase in wages. The income effect is positive, which indicates that marketing and management activities of husbands are normal goods, those for which demand increases as incomes rise. Families with higher incomes, perhaps, have more management tasks to perform and more opportunities for shopping for discretionary expenditures, which may require more time inputs by husbands, especially since these are activities for which there are relatively few good market substitutes. Husbands' interests in home production tasks are positively related to their time in marketing and management activities. Even with wage rates and income held constant, husbands' who reported having some interest in household work spent more time at it.

Table 14 shows the relationships between productivity, taste, and situational factors and husbands' time inputs into home, yard, car, and pet care activities. Although the equations explained from around 20 to 27 percent of the variability in husbands' time in these activities, none of these proportions of explained variability are statistically significant. The signs of the coefficients are the same across estimation techniques with the exception of that for the age of the youngest child and situational factors, neither of which have statistically significant effects in either estimation technique. In the OLS equation which contained the observed value for wives' time inputs

inputs into household production, that effect is positive and significant, indicating that husbands' and wives' time in home, yard, car, and pet care activities are complementary. However, in the 3SLS technique, although the direction of the effect is the same, it is no longer statistically significant. Even when it is significant, the complementarity between spouses is not unitary; that is, as wives' time inputs increase an hour, husbands' time increase only about six minutes, indicating that only weak complementarity between the spouses exists. Again, husbands' interests in household production tasks is positively related to their home maintenance, pet and yard care time. Although the effects of the other productivity and taste variables are generally in the expected directions, their effects are not statistically significant.

The factors related to husbands' time inputs into clothing care and construction are shown in Table 15. This component of household production by husbands clearly showed the weakest relationships to the selected exogenous variables of all the household production components. Recall that this was the activity in which very few husbands spent any time at all. The fact that there were so many zero observations on the dependent variable, distorts the operation of both OLS and 3SLS techniques which are meant for use with a continuous dependent variable with a normally distributed error term (a technique called Tobit is more appropriate). In none of the results was the proportion of variability explained statistically significant, although from 15 to 20 percent was explained.

The only statistically significant effect found for any of the productivity, taste, or situational variables was that for wives' time inputs into household production in the OLS equation. However, this relationship was both absolutely small and barely statistically significant. The small negative coefficient for wives' time inputs indicates that spouses' time inputs are weak substitutes for each other in clothing care and construction.

Husbands' time inputs into family care activities, which included both physical and non-physical care tasks, are shown in relation to the selected exogenous variables in Table 16. As expected, the effect of the age of the youngest child was significantly negatively related to husbands' time inputs into family care. The presence of younger children increased the time husbands' spent in those activities, substantially. For every year increase in the age of the youngest child present in the home, the time spent by husbands in family care decreased by about 13 or 14 minutes, indicating, for example, that fathers of one-year-old children could be expected to spend three more hours per week in family care than fathers of 15-year-olds. None of the other productivity, taste, or situational variables were significantly related to husbands' family care time; however, it is worth noting that this activity is the only one for which the estimated wage effect is consistently positive. Next to the equations for food preparation and clean-up, the equations for husbands' time in family care activities explained the greatest proportion of variability--from 30 to 33 percent, in all cases, a statistically significant proportion.

Summarized in Table 17 are the relationships found in the OLS equations for husbands' time inputs into the components of household production. It was decided to present the OLS results because of the statistical significance of the wives' time input variable. Although simultaneity bias is, of course, a problem with these OLS equations, the relationships estimated are, in every case, very similar to those found in the 3SLS procedure. The absence of statistical significance in the latter set of equations may be due to the reduction in the degrees of freedom necessary for the estimation of the system of equations.

Husbands' wage rates were negatively related to their time in household production, which indicates that as the price of husbands' time increases, their time in non-market work decreases. The negative wage coefficient found for marketing and management indicates that for the Z commodities produced using husbands' inputs (perhaps such diverse "goods" as the information search for consumer durables and completed income tax returns and balanced checkbooks), the direct substitution effect dominates. Indeed, these activities may be those for which there are the fewest close market substitutes.

The effect of income on husbands' total household production time was positive, indicating that, on the whole, home-produced commodities are normal goods, those for which families' demand increases as income rises. The positive income effect for husbands' marketing and management activities reinforces the assertion that these activities are those for which there are few substitutes for the husbands' time.

Table 17

Summary of Relationships Found for Husbands' Time
Inputs Into Various Activities

Variable	HP	FP	MKMT	HYCP	CC	FC
Husbands' Wage	-	0	-	0	0	0
Family Income	+	0	+	0	0	0
Wives' Time Inputs Into Household Production	+	-	+	+	-	0
Husbands' Education	0	0	0	0	0	0
Husbands' Age	0	+	0	0	0	0
Husbands' Competence	0	0	0	0	0	0
Husbands' Attitudes	0	0	0	0	0	0
Husbands' Interests	+	0	+	+	0	0
Age of Youngest Child	0	-	0	0	0	-
Season	0	0	0	0	0	0
Situational Factors	0	0	0	0	0	0
R^2	.39***	.44***	.31*	.27	.21	.33**

*p < .10

**p < .05

***p < .01

Ceteris paribus, even when the family income increases (when they could better afford to purchase market substitutes), husbands still spent more time in marketing and management tasks as their incomes rose. Time spent by husbands in other specific household production activities are generally insensitive to changes in family income.

What is the relationship between the time inputs of spouses? Surprisingly, husbands' and wives' time inputs into all household production tasks considered together are complementary; that is, as wives increase their time in home production, so do husbands, although the relationship is not unitary. An increase of an hour of wives' time is associated with an increase of only about 11 minutes of husbands' time in all household tasks. When analyzed separately, spouses' time in the various components of household work show different relationships. Generally, as wives' time in household production increases, husbands' time increases in marketing and management and home, yard, car, and pet care activities. Activities for which husbands' time is substitutable for wives' time include food preparation and clean-up and clothing care and construction tasks. Surprisingly, no significant relationship between spouses' time inputs in family care were found.

Husbands' age was positively related to their time in food preparation; for every year older a husband is, his time in food preparation tasks increases about 16 minutes. A closer look at descriptive data suggests that much of husbands' time in food preparation is involved, not in meal preparation and clean-up for the entire family, but in food preparation for themselves when they eat separately from their

wives. Husbands' age was related to neither their total time in household work nor to their time in the component activities.

Husbands' interests in household production tasks are an important determinant of the time they spend in household work. Husbands' interests in and motivation to perform household work were consistently positively related to their time inputs; this relationship was significant for all household production, marketing and management activities, and home, yard, car, and pet care activities. Even when the effects of all other productivity and taste factors are controlled, husbands who enjoyed certain tasks spent more time in those tasks.

As expected, husbands' time in all household work was negatively related to the age of the youngest child, which indicates that husbands with younger children present spent more time in household production activities. The presence of young children increases the home production efforts of husbands specifically in food preparation and clean-up and family care activities. These activities may be those which are most closely related to the needs of younger children; thus, the marginal value of husbands' output in these activities increases when there are young children present.

Several factors, husbands' educational level, their competence in household production tasks, and their attitudes toward sex roles, and the situational factors, season and meteorological/physiological factors, were not significantly related to husbands' household work time. The simple correlations between husbands' time inputs and these variables were generally low, indicating that the absence of results was not unique to these estimation techniques. The directions of the relationships, although not statistically significant, were plausible.

Comparing the results presented here with those of other studies, summarized in Table 1, reveals that, where significant, the effects found were consistent with previously reported findings. For example, the negative wage effect found by Bloch (1973), Nickols and Metzen (1978), and Hunt and Kiker (1978) was replicated here, as was the relationship between the presence of young children and husbands' time inputs into household work. Some of the effects found previously were not replicated here and others were found in this study where no relationships had been confirmed previously. The fact that the wives' characteristics were not included in the husbands' equations in this study may account for some of these differences. On the whole, these results, even for a sample which is considerably smaller than that of some previous studies, indicated that a much greater portion of the variability in husbands' time use was explained in this study. Whereas the R^2 's of previous studies ranged from .04 to .12, these equations explained from 21 to 44 percent of the variability in the different components of husbands' time use.

Discussion

Based on the preceding results, several tentative conclusions, limited by the methodological deficiencies of the study (particularly the small sample size, the "noise" in the dependent variables, and the limited family type studied), can be presented. The descriptive data confirmed that, notwithstanding popular speculation to the contrary, specialization between spouses in labor market work and household

production still exists, at least in this sample of rural North Carolina households. Perhaps in this sample of families with young children, this specialization is particularly evident. Only 32 of 105 wives worked in the labor market; they averaged between six and seven hours a day in all household production. All of the husbands were employed, and their contributions to household work activities averaged about an hour and a half per day. Moreover, their greatest contributions came in household tasks that have traditionally been stereotyped as masculine activities, i.e., home, yard, car, and pet care, and marketing and management tasks.

The results did generally confirm the predictions of the model (at least in the direction of the effects, if not always in their statistical significance). Husbands' household production time allocation decisions were generally responsive to several economic and socio-psychological factors. Changes in wage rates produced opposite changes in husbands' time allocation to household work, specifically in marketing and management activities. Their relative productivity of their time spent in these activities becomes lower (compared to labor market work) as their wage rises; thus, goods-intensive household production technologies become more attractive, e.g., hiring income tax consultants, shopping by phone, and purchasing other managerial services in the market.

The positive income effect for husbands' household production time indicates that the demand for home commodities, particularly those produced by husbands' time inputs in home, yard, car, and pet care, and marketing and management tasks, exceeds the demand for

increased leisure as families' incomes increase. In fact, the estimated effect of income on husbands' leisure was negative (one of the contradictions regarding the unambiguous predictions of the model), which was probably due to the "contaminated" family income variable used but was not statistically significant.

Spouses' time in all household production tasks were, surprisingly, complementary, indicating that as wives' time inputs into home production increased, so did husbands'. Those activities which, when broken down into components of home production, were complementary were the two activities in which the husbands spent the most time, home, yard, car, and pet care, and marketing and management. Husbands' and wives' time inputs into food preparation and clothing care were substitutes. When wives' time allocation to these activities increased, husbands' decreased, giving further support to the specialization of labor regarding certain tasks.

Elasticities of substitution between husbands and wives indicated that husbands' time inputs into household production were most responsive to changes in wives' time from household production to market work or from leisure to either household work or labor market work. Husbands' proportionate contributions to all household work did increase when wives' "went to work," while their time allocation to market work and to leisure were unresponsive to changes in their wives' time allocation patterns.

The primary socio-psychological factor of note was husbands' interests in household tasks, which was strongly positively related to their time in household production, again primarily in tasks involving

marketing and management and home, yard, car, and pet care. Perhaps because of the imprecision with which the other socio-psychological variables were measured, none of the other "taste" factors were significantly related to husbands' time allocation. Remaining convinced that the inclusion of socio-psychological variables is useful and, indeed, necessary, this author believes that future work on the specification and measurement of such factors is needed. More study of the possible causal antecedents of these effects is also necessary if further refinement of simultaneous equations systems is to be effected.

CHAPTER VI

SUMMARY

The study of the time allocation of family members has occurred within the disciplines of economics, home economics, sociology, and social psychology, albeit with different purposes and methodologies. Traditionally, in economic analysis, much more attention has been given to the allocation of time for labor market work than to non-market activities. Since Becker's (1965) pioneering work and the development of the "new" economics of the family, some work has focused on spouses' time inputs into household production. Sociologists, viewing the family as a unit of interacting individuals, have focused on spouses' role expectations and behavior when studying the division of labor between spouses. Home economists, while not formally developing theory, have relied upon family composition variables and constraints upon individuals' time use to explain differences in time allocation to household production among individuals.

Few interdisciplinary attempts at explaining the allocation of time by family members have been made. Rather, research in several disciplines has focused on several, sometimes competing, explanations of the operation of the family's time allocation process. The primary purpose of this study was to investigate the relationships between husbands' time inputs into household production and certain economic, socio-psychological, and situational factors.

Two sources of simultaneity within the family time allocation decision process, the interrelationships between each individual's time in home production, market work, and leisure and the interdependence of husbands' and wives' time decisions, suggested that a systems approach to the problem was desirable. A six-equation model of family time allocation was developed; it posited effects on husbands' time in household production from husbands' wage rates, family income, wives' time inputs into home production, husbands' education, age and competence in household production, husbands' attitudes toward sex roles and interests in household production, and the age of the couples' youngest child. These relationships were tested holding constant situational factors, the season of the year and the existence of physiological/meteorological constraints on time use. Similar effects of wives' characteristics on their time allocation were hypothesized in the model. While these results were not reported here, their predicted values were included in the 2SLS/3SLS equations of husbands' time use.

Time use data, reported by wives, were collected from 105 rural North Carolina families, randomly selected according to a sampling plan which stratified the population by five categories of the age of the youngest child, by seven days of the week, and by three seasons of the year. Two 24-hour time records were completed for the time use of all family members over six years old. Two statistical techniques, ordinary least squares (OLS) and two-stage least squares/three-stage least squares, were utilized to test the hypothesized relationships.

The relative productivity of spouses' time use in various activities, as well as their tastes, were posited to affect the allocation of time of husbands in all household production tasks and in five component activities, food preparation and clean-up, marketing and management, home, yard, car and pet care, clothing care and construction, and family care.

The descriptive results of the study indicated that, despite popular assertions to the contrary, husbands still spend relatively little time in household production. When they do contribute time, it is likely to be in traditionally male-stereotyped activities. Husbands averaged about 80 minutes per day in all household work, compared to about six hours per day for wives. The activities in which husbands spent the most time were home, yard, car, and pet care ($\bar{X} = 31$ minutes/day) and in marketing and management ($\bar{X} = 24$ minutes/day). Husbands spent an average of 13 minutes per day in all family care, including physical and non-physical care of children, and about 12 minutes per day in food preparation and clean-up. Virtually no time, an average of one minute per day, was contributed by husbands to clothing care and construction activities.

Weekly estimates of time inputs into each of these activities were estimated for those spouses for whom was recorded one weekday and one weekend day ($n=60$) by weighting the weekday by five and the weekend day by two. This procedure analyzed estimated time use over a longer, conceptually more appropriate period, but produced extra "noise" in the dependent variables of both spouses.

Since a large number of women were not employed in the labor market and since the market wage was to be used as a measure of the opportunity cost of non-market time, the predicted potential wage rate of wives was calculated, using regression equations for full-time labor market earnings of a national sample of women. Estimates for this sample were adjusted for regional differences, rural location, and inflation. Attempts to compute the non-earned income of families were unsuccessful; thus, total family income, which included the earnings of both spouses from market work, was used. All other exogenous variables were entered as continuous variables, except for the situational factors which were entered as dummy variables.

Results for the OLS and 2SLS/3SLS estimation procedures were compared for each of the time inputs of husbands. Although the magnitude of the regression coefficients differed across estimation techniques, the direction of the signs of the significant coefficients and their statistical significance generally did not. The inclusion of the wives' observed time inputs into the husbands' equations in the OLS equations constituted a source of simultaneity bias; however, the direction and magnitude of these effects did not differ substantially from those reported in the 2SLS/3SLS estimates.

The factors which affected husbands' total household production time were wage rate, which had a negative effect, and family income, wives' time in home production, and husbands' interests in household tasks, all of which were positively related to husbands' time use of home production. In the 2SLS/3SLS procedure, the inclusion of wives'

predicted market work produced a statistically significant effect which replaced the significant effect of husbands' wage, family income, and wives' time in home production.

Although spouses' time inputs in all household production were complementary, husbands' time in food preparation and clean-up was negatively related to wives' household production time, indicating substitutability, though not one-for-one, between those inputs. Husbands' food preparation also increased with a decrease in the age of the youngest child present in the home and increased with husbands' age.

The factors affecting husbands' time inputs into marketing and management tasks were the same as those affecting their total household work time. Husbands' wage rates were inversely related to their marketing and management time, indicating that as the price of this input increased, the demand for husbands' contributions in management/marketing activities decreased. Market-goods intensive technologies were probably substituted for husbands' time inputs, since husbands' and wives' inputs were positively related for these tasks. Family income and husbands' interests in home production tasks were also positively related to husbands' time in marketing and management.

Husbands' time use for home, yard, car, and pet care was also a complementary input to their wives' home production time. Again, the relationship was not one-for-one; as wives' HYCP time increased an hour, husbands' time in these activities increased about six minutes. Again, also, husbands who reported more interest in household tasks were more likely to spend more time in home, yard, car, and pet care activities.

The only factor which was significantly related to husbands' time inputs into clothing care and construction was wives' time in household production, which has a small negative effect on husbands' time. Very few husbands spent any time at all in clothing care tasks, which probably accounted for the comparatively low proportion of explained variability for that set of tasks.

Husbands' time in family care activities, which included both physical and non-physical care of any family members, was negatively related to the age of the youngest child. As expected, husbands in families with younger children spent significantly more time in family care activities. None of the other productivity or taste factors were significantly related to husbands' time in family care, although a significant portion of the variability of husbands' time in these tasks was explained.

Elasticities of substitution between husbands and wives indicated that husbands' time inputs into household production were most responsive to changes in wives' time from household production to market work or from leisure to either household work or labor market work. Husbands' proportionate contributions to all household work did increase when wives "went to work," while their time allocation to market work and to leisure were unresponsive to changes in their wives' time allocation patterns. As the productivity of husbands and wives in labor market work becomes more equal in the future (because of advancement in women's educational level and market work experience), the relative productivity of the spouses in home and market production should result in greater contributions by husbands for household work activities.

The major contributions of this research to the analysis of the time allocation decisions of spouses are: (1) its use of both economic and socio-psychological explanations of factors affecting family members' time use; (2) its use of both a single equation and a simultaneous equations estimation technique for tests of these effects; (3) its detailed examination of the relationships between husbands' and wives' time inputs into total household production and into categories of household work; and (4) its inclusion of a more comprehensive definition of household production than found in previous studies.

The study showed the usefulness of an interdisciplinary approach in explaining husbands' time allocation in household production. Further refinements in the measurement of certain economic and socio-psychological factors and application of this approach with larger, more diverse samples may result in additional illumination of the time allocation process of spouses.

BIBLIOGRAPHY

- Albrecht, S. L., Bahr, H. M., & Chadwick, B. A. Changing family and sex roles: An assessment of age differences. Journal of Marriage and the Family, 1979, 42, 41-50.
- Aldous, J. Occupational characteristics and male's role performance in the family. Journal of Marriage and the Family, 1969, 31, 707-712.
- Allport, G. Attitudes. In C. Murchinson (Ed.), Handbook of social psychology. Worcester, Mass.: Clark University Press, 1935, 798-884.
- Araji, S. K. Husbands' and wives' attitude-behavior congruence on family roles. Journal of Marriage and the Family, 1977, 39, 309-320.
- Arnoff, J., & Crano, W. D. A re-examination of the cross-cultural principles of task segregation and sex role differentiation in the family. Journal of Marriage and the Family, 1975, 40, 12-20.
- Bagozzi, R. P., & Van Loo, M. F. Fertility as consumption: Theories from the behavioral sciences. Journal of Consumer Research, 1978, 4, 199-228.
- Bahr, S. J. Comment on "The study of the family power structure: A review 1960-1969." Journal of Marriage and the Family, 1972, 34, 239-244.
- Baum, M. Love, marriage and the division of labor. Sociological Inquiry, 1971, 41, 107-117.
- Becker, G. S. A theory of the allocation of time. Economic Journal, 1965, 75, 493-517.
- Becker, G. S. On the relevance of the new economics of the family. American Economic Review, 1974, 64, 317-319.
- Becker, G. S. The economic approach to human behavior. Chicago: University of Chicago Press, 1976.
- Blau, P. Exchange and power in social life. New York: John Wiley and Sons, 1964.

- Bloch, F. The allocation of time to market and non-market work within a family unit. Technical Report No. 114. Institute of Mathematical Studies in the Social Sciences. Stanford University, 1973.
- Blood, R. O., Jr. Long-range causes and consequences of the employment of married women. Journal of Marriage and the Family, 1965, 27, 43-47.
- Blood, R. O., Jr., & Wolfe, D. M. Husbands and wives. New York: Free Press, 1960.
- Boserup, E. Women's role in economic development. New York: St. Martin's Press, 1970.
- Burgess, E. W., & Locke, H. J. The family: From institution to companionship. (3rd ed.). New York: American Book Co., 1963.
- Centers, R., Bertram, H., & Rodriguez, A. Conjugan power structure: A Re-examination. American Sociological Review, 1971, 36, 264-277.
- Chadwick, B. A., Albrecht, S. L., & Kunz, P. R. Marital and family role satisfaction. Journal of Marriage and the Family, 1976, 38, 431-440.
- Clark, R. A., Nye, F. I., & Gecas, V. Husbands' work involvement and marital role performance. Journal of Marriage and the Family, 1978, 40, 9-21.
- Clavan, S. Impact of feminism on American family structure. Unpublished doctoral dissertation, Temple University, 1972.
- Cochrane, S. H., & Logan, S. P. The demand for wife's nonmarket time: A comparison of results from surveys of Chicago school teachers and South Carolina college graduates. Southern Economic Journal, 1977, 44, 285-293.
- Cowles, M. L., & Dietz, R. P. Time spent in homemaking activities by a selected group of Wisconsin farm homemakers. Journal of Home Economics, 1956, 48, 1, 32-33.
- Darling, M. The role of women in the economy. Paris, France: Organization for Economic Cooperation and Development, 1975.
- Edwards, J. N. Familial behavior as social exchange. Journal of Marriage and the Family, 1969, 31, 518-526.
- Farkas, G. Education, wage rates and the division of labor between husband and wife. Journal of Marriage and the Family, 1976, 38, 473-483.

- Fishbein, M. An investigation of the relationships between beliefs about an object and the attitude toward that object. Human Relations, 1963, 16, 233-239.
- Fishbein, M. Attitude and the prediction of behavior. In M. Fishbein (Ed.), Readings in attitude theory and measurement. New York: Wiley, 1967.
- Fishbein, M. The search for attitudinal-behavioral consistency. In J. B. Cohen (Ed.), Behavioral sciences foundations of consumer behavior. New York: Free Press, 1972.
- Fisher, F. M., & Ando, A. Two theorems on "ceteris paribus" in the analysis of dynamic systems. In H. M. Blalock (Ed.), Causal models in the social sciences. Chicago: Aldine, 1971.
- Gans, H. The urban villagers. New York: The Free Press, 1962.
- Garfinkel, I., & Haveman, R. Earnings capacity and its utilization. Quarterly Journal of Economics, 1978, 92, 375-385.
- Geiken, K. F. Expectations concerning husband-wife responsibilities in the home. Journal of Marriage and the Family, 1964, 26, 349-352.
- Ghez, G. R., & Becker, G. S. The allocation of time and goods over the life cycle. New York: Columbia University Press for the National Bureau of Economic Research, 1975.
- Giele, J. Changing sex roles and the future of marriage. In H. Grunebaum & J. Christ (Eds.), Contemporary marriage, structure, dynamics, and therapy. Boston: Little, Brown & Co., 1976.
- Goode, W. A theory of role strain. American Sociological Review, 1960, 25, 483-496.
- Gramm, W. L. The demand for the wife's non-market time. Southern Economic Journal, 1974, 41, 124-133.
- Gronau, R. The measurement of output of the non-market sector: The evaluation of housewives' time. In M. Moss (Ed.), The measurement of economic and social performance. New York: Columbia University Press, 1973.
- Gronau, R. The allocation of time of Israeli wives. Journal of Political Economy, 1976, 84, S201-220.
- Gronau, R. Leisure, home production, and work: The theory of the allocation of time revisited. Journal of Political Economy, 1977, 85, 1099-1123.

- Haavio-Mannila, E. Sex differentiation in role expectations and performance. Journal of Marriage and the Family, 1967, 29, 568-578.
- Hall, F. T., & Schroeder, M. Effects of family and housing characteristics on time spent on household tasks. Journal of Home Economics, 1970, 62, 23-29.
- Hansen, F. Psychological theories of consumer choice. Journal of Consumer Research, 1976, 3, 117-142.
- Hawkins, J. L. Association between companionship, hostility and marital satisfaction. Journal of Marriage and the Family, 1968, 30, 647-650.
- Hawrylyshyn, O. The value of household services: A survey of empirical estimates. Review of Income and Wealth, 1976, 22, 101-131.
- Hawrylyshyn, O. Toward a definition of non-market activities. Review of Income and Wealth, 1977, 23, 79-96.
- Heer, D. M. Husband and wife perceptions of family power structure. Marriage and Family Living, 1962, 24, 65-67.
- Heer, D. M. The measurement and bases of family power: An overview. Marriage and Family Living, 1963, 25, 133-139.
- Hill, C. R., Hunt, J. C., & Kiker, B. F. Household division of labor: An analysis of South Carolina families. Unpublished manuscript, University of Georgia, 1979.
- Hirshleifer, J. Price theory and applications. Englewood Cliffs, NJ: Prentice-Hall, 1976.
- Hoffman, L. W. Parental power relations and the division of household tasks. In F. I. Nye & L. W. Hoffman (Eds.), The employed mother in America. Chicago: Rand McNally, 1963.
- Holter, H. Sex roles and social change. In C. Safilios-Rothschild (Ed.), Toward a sociology of women. Lexington, Mass.: Xerox College Publishing, 1972.
- Homans, G. Social behavior: Its elementary forms. New York: Harcourt, 1961.
- Hong, L. K. A profile analysis of the Chinese family in an urban industrialized setting. International Journal of Sociology of the Family, 1973, 3, 1-9.
- Hunt, J. C., & Kiker, B. F. Intrafamily allocation of time: Home production and leisure. Unpublished manuscript, 1978.

- Intriligator, M. D. Econometric models, techniques and applications. Englewood Cliffs, NJ: Prentice-Hall, 1978.
- Janeway, E. Man's world, women's place: A study in social mythology. New York: Dell, 1971.
- Kellar, B. The construction and validation of a scale for measuring attitude toward any homemaking activity. Purdue University Studies in Higher Education XXVI, 1934, 35, 47-63.
- Komarovsky, M. Cultural contradictions and sex roles. American Journal of Sociology, 1946, 52, 185-189.
- Komarovsky, M. Cultural contradictions and sex roles: The masculine case. American Journal of Sociology, 1973, 79, 111-112.
- Kyrk, H. The family in the American economy. Chicago: University of Chicago Press, 1953.
- Lamouse, A. Family roles of women. Tehran Tenth International Seminar on Family Research, Institute for Social Studies and Research, University of Tehran, 1968.
- Liebowitz, A. Education and home production. American Economic Review, 1974, 64, 243-250.
- Levinger, G. Task and social role specialization of husband and wife behavior in marriage. Sociometry, 1964, 27, 433-448.
- Lloyd, C. B. (Ed.). Sex, discrimination, and division of labor. New York: Columbia University Press, 1975.
- Lopata, H. Z. Occupation: Housewife. New York: Oxford University Press, 1971.
- Lovejoy, D. D. College student conceptions of the roles of the husband and wife in family decision-making. Family Life Coordinator, 1961, 9, 43-46.
- Lynch, M. Sex role stereotypes: Household work of children. Human Ecology Forum, 1975, 5, 3, 2-5.
- Maccoby, E. E., & Jacklin, C. The psychology of sex differences. Stanford, Cal.: Stanford University Press, 1974.
- Manning, S. Time use in household tasks by Indiana families. Purdue University Agricultural Experiment Station Bulletin No. 837, 1968.
- Mason, K. O., & Bumpass, L. L. U.S. women's sex-role ideology, 1970. American Journal of Sociology, 1974, 80, 1212-1219.

- Miller, S. M. The making of a confused, middle-aged husband. In C. Safilios-Rothschild (Ed.), Toward a sociology of women. Lexington, Mass.: Xerox College Publishing, 1972.
- Mincer, J. Labor force participation of married women: A study of labor supply. In National Bureau of Economic Research, Aspects of Labor Economics. Princeton, NJ: Princeton University Press, 1962.
- Money, J., & Ehrhardt, A. Man and woman: Boy and girl. Baltimore: John Hopkins University Press, 1972.
- Morgan, J. N., Sirageldin, I. A., & Baerwaldt, N. Productive Americans: A study of how individuals contribute to economic progress. Ann Arbor: University of Michigan Press, 1968.
- Mowrer, E. R. The differentiation of husband and wife roles. Journal of Marriage and the Family, 1969, 31, 534-540.
- Murdock, G. P. Comparative data on division of labor by sex. Social Forces, 1937, 15, 551-553.
- Nickols, S. Y., & Metzen, E. J. Housework time of husband and wife. Home Economics Research Journal, 1978, 7, 85-97.
- North Carolina Statistical Abstract, (4th ed.). Raleigh, NC: Research and Planning Services, N.C. Division of State Budget and Management, 1979.
- Oakley, A. Woman's work: The housewife, past and present. New York: Pantheon, 1974.
- Osmond, M. W., & Martin, P. Y. Sex and sexism: A comparison of male and female sex-role attitudes. Journal of Marriage and the Family, 1975, 37, 744-758.
- Parsons, T., & Bales, R. F. Family socialization and interaction process. Glencoe: Free Press, 1955.
- Penalosa, F. Mexican family roles. Journal of Marriage and the Family, 1968, 30, 680-688.
- Pfeil, E. Role expectations when entering into marriage. Journal of Marriage and the Family, 1968, 30, 161-165.
- Pindyck, R. S., & Rubinfeld, D. L. Econometric models and economic forecasts. New York: McGraw-Hill, 1976.
- Pollak, R. A., & Wachter, M. L. The relevance of the household production function and its implications for the allocation of time. Journal of Political Economy, 1975, 83, 255-277.

- Rapoport, R., & Rapoport, R. Marriage and career. In H. Grunebaum & J. Christ (Eds.), Contemporary marriage structure, dynamics and therapy. Boston: Little, Brown & Co., 1976.
- Reid, M. The economics of household production. New York: Wiley, 1934.
- Reiss, I. Family systems in America. Second edition. Hinsdale, Ill.: Dryden Press, 1976.
- Richey, L. T. Attitudes toward feminism: The development of an attitude scale. Unpublished Master's thesis, University of North Carolina at Greensboro, 1972.
- Richmond, M. L. Beyond resource theory: Another look at factors enabling women to affect family interaction. Journal of Marriage and the Family, 1976, 38, 257-266.
- Rodman, H. Marital power in France, Greece, Yugoslavia and the United States: A cross-national discussion. Journal of Marriage and the Family, 1967, 29, 320-324.
- Rosenstein-Rodan, P. N. The role of time in economic theory. Economica, 1934, 15, 77-97.
- Safilios-Rothschild, C. Toward a sociology of women. Lexington, Mass.: Xerox, 1972.
- Sanik, M. M. A twofold comparison of time spent in household work in two-parent, two-child households: Urban New York State in 1967-68 and 1977; Urban-rural, New York-Oregon in 1977. Unpublished doctoral dissertation, Cornell University, 1979.
- Slater, P. E. Parental role differentiation. American Journal of Sociology, 1961, 67, 296-308.
- Stafford, R., Backman, E., & Dibona, P. The division of labor among cohabiting and married couples. Journal of Marriage and the Family, 1977, 39, 43-57.
- Stigler, G. J., & Becker, G. S. De gustibus non est disputandum. American Economic Review, 1977, 67, 76-90.
- Szalai, A. (Ed.). The use of time. Paris-The Hague: Mouton Press, 1972.
- Touba, J. R. Sex role differentiation in Iranian families living in urban and rural areas of a region undergoing planned industrialization in Iran (Arak Shahrestan). Journal of Marriage and the Family, 1975, 37, 437-445.

- Vanek, J. Time spent in housework. The Scientific American, 1974, 11, 116-120.
- Walker, K. E., & Woods, M. E. Time use: A measure of household production of family goods and services. Washington, DC: American Home Economics Association, 1976.
- Walker, K. E. Time spent by husbands in household work. Family Economics Review, 1970, 6, 8-11.
- Wallin, P. Cultural contradictions and sex roles: A repeat study. American Sociological Review, 1950, 15, 288-293.
- Warren, J. Use of time in its relation to home management. Cornell University Agricultural Experiment Station Bulletin No. 734, 1940.
- Wiegand, E. Comparative use of time of farm and city full-time homemakers and homemakers in the labor force in relation to home management. Unpublished doctoral dissertation, Cornell University, 1953.
- Wiegand, E. Use of time by full-time and part-time homemakers in relation to home management. Cornell University Agricultural Experiment Station Memoir 330, 1954.
- Wilson, M. Use of time by Oregon farm homemakers. Oregon State College Agricultural Experiment Station Bulletin No. 256, 1929.
- Winick, C. The beige epoch: Depolarization of sex roles in America. The Annals, 1968, 376, 18-24.
- Young, M., & Willmott, P. The symmetrical family. New York: Pantheon Books, 1973.
- Zelditch, M., Jr. Role differentiation in the nuclear family: A comparative study. In T. Parsons & R. Bales (Eds.), Family Socialization and Interaction Process. Glencoe, Ill.: Free Press, 1955.

APPENDIX A
ELASTICITIES

Elasticities

The first elasticity of interest, associated with the wage effect, is the price elasticity of demand for good x , which, evaluated at the means, is defined as

$$\epsilon_x = \frac{\partial x}{\partial P_x} \cdot \frac{\bar{P}_x}{x} \quad \text{OR} \quad \epsilon_x = \frac{x}{P_x} \left(\frac{\partial x}{\partial P_x} \right) \Big|_{\bar{P}_x, \bar{y}, \bar{I}} \equiv \frac{\partial \ln x}{\partial \ln P_x}$$

which is the change in quantity demanded of x over the change in the price of x multiplied by the ratio of price to quantity of x . The magnitude of this value indicates the responsiveness of demand for good x to its price. If the price elasticity of demand exceeds one, i.e., $|\epsilon_x| > 1$, then the good x is said to be price elastic. If the elasticity is less than one, i.e., $|\epsilon_x| < 1$, the goods are price inelastic. The price elasticity is also used as a criteria by which a good is deemed either a normal good or a Giffen good. If the price elasticity is negative, the good is normal; when its price increases, the demand for the good decreases. If the price elasticity is positive, the good is a Giffen good, one for which demand increases as its price increases (when the prices of other goods and income is held constant). More often, the example of a Giffen good is given as one for which a decrease in price leads to a net decrease in quantity demanded because the abnormal (negative) income effect outweighs the normal substitution effect.

Similarly, the income elasticity of demand, evaluated at the means, is defined as:

$$\eta_x = \frac{\partial x}{\partial I} \cdot \frac{\bar{I}}{x} \quad \text{OR} \quad \eta_x = \frac{x (\bar{P}_x, \bar{P}_y, \bar{I})}{I} \cdot \frac{I}{x} \equiv \frac{\partial \ln x}{\partial \ln I}$$

The value η_x is the percentage change in the quantity demanded of x (holding constant p_x and p_y) associated with a one percent change in income. Analogous labels are attached to these elasticity values. If $|\eta_x| > 1$, the good is said to be income elastic; if $|\eta_x| < 1$, the good x is income inelastic. Usually, the income elasticity, as defined, is positive; if so, the good is called a normal or superior good. However, if the income elasticity is negative, the good is called an inferior good.

A final elasticity is the cross price elasticity of demand, defined at the means as

$$\epsilon_{xy} = \frac{\partial x}{\partial p_y} \cdot \frac{P_y}{x} \quad \text{OR} \quad \epsilon_{xy} = \frac{x (\bar{P}_x, P_y, \bar{I})}{P_y} \cdot \frac{P_y}{x} \equiv \frac{\partial \ln x}{\partial \ln p_y}$$

which indicates the effect of a change in the price of good y on the demand for good x . From these cross elasticities can be determined the substitutability or complementarity of goods x and y or, in this case, of the time inputs of husbands and wives. If the cross elasticity is positive, i.e., $|\epsilon_{xy}| > 1$, then the goods are substitutes; an increase in the price of y will increase the demand for x . If the cross elasticity is negative, i.e., $|\epsilon_{xy}| < 1$, the goods are complements; a rise in the price of y decreases the quantity demanded of x .

APPENDIX B

DEFINITIONS OF ACTIVITIES OF HOUSEHOLD PRODUCTION

NEW YORK STATE COLLEGE OF HUMAN ECOLOGY
A Statutory College of the State University
Cornell University, Ithaca, New York

Department of Consumer Economics and Public Policy

User-of-time Research Project
Definition of Activities of Household Members

FOOD

1. Food Preparation

All tasks relating to the preparation of food for meals, snacks, and future use.

Include time spent setting the table and serving the food.

2. Dishwashing

In addition to washing and drying dishes, loading and unloading dishwasher or dish drainer.

Include after-meal cleanup of table, leftovers, kitchen equipment and refuse.

SHOPPING

3. Shopping

All activities related to shopping for food, supplies, equipment, furnishings, clothing, durables, and services, whether or not a purchase was made (by telephone, by mail, at home, or at the store). Also include:

Comparison shopping

Putting purchases away

Getting or sending of mail and packages

Hiring of services (cleaning, repair, maintenance, other)

HOUSE

4. Housecleaning

Any regular or periodic cleaning of house and appliances, including such tasks as:

Mopping, vacuuming, sweeping, dusting, waxing
 Washing windows or walls
 Cleaning the oven; defrosting and cleaning the refrigerator or freezer
 Making beds and putting rooms in order

5. Maintenance of Home, Yard, Car and Pets

Any repair and upkeep of home, appliances, and furnishings such as:

Painting, papering, redecorating, carpentry
 Repairing equipment, plumbing, furniture
 Putting up storm windows or screens
 Taking out garbage and trash
 Care of houseplants, flower arranging

Daily and periodic care of outside areas such as:

Yard, garden
 Sidewalks, driveways, patios, outside porches
 Garage, tool shed, other outside areas
 Swimming pool

Maintenance and care of family motor vehicles (car, truck, van, motorcycle, snowmobile, boat)

Washing, waxing
 Changing oil, rotating tires and other maintenance and repair work
 Taking motor vehicle to service station, garage, or car wash

Feeding and care of house pets. Also include trips to kennel or veterinarian.

CLOTHING AND HOUSEHOLD LINENS

6. Care

Washing by machine at home or away from home, including:

Collecting and preparing soiled items for washing
 Loading and unloading washer or dryer
 Hanging up items and removing from the line
 Folding

Hand washing
 Ironing and pressing. Also include:

Getting out equipment, sprinkling

Putting away cleaned items and equipment
 Polishing shoes
 Preparing items for commercial laundry or dry cleaning
 Seasonal storage of clothing and textiles

7. Construction

Making alterations or mending
 Making clothing and household accessories (draperies, slip-covers, napkins, etc.) include such activities as:

Sewing
 Embroidering
 Knitting, crocheting, macrame

If these activities are to make product for self, immediate family members or to give as gift, include under (7).

If activity is primarily to produce product for sale, include time under paid work (12).

If activity is primarily as recreation rather than goal motivated, include time under "recreation" (15).

HOUSEHOLD MEMBERS

8. Physical Care

All activities related to physical care of household members other than self such as:

Bathing, feeding, dressing and other personal care
 First aid or bedside care
 Taking household members to doctor, dentist, barber

9. Nonphysical Care

All activities related to the social and educational development of household members such as:

Playing with children
 Teaching, talking, helping children with homework
 Reading aloud
 Chauffeuring and/or accompanying children to social and educational activities
 Attending functions involving your child

MANAGEMENT

10. Management

Making decisions and planning such as:

Thinking about, discussing, and investigating alternatives

Looking for ideas and seeking information

Assessing resources available (space, time, money, etc.)

Planning--family activities, vacations, menus, shopping lists, purchases and investments

Supervising and coordinating activities

Checking plans as they are carried out

Thinking back to see how plans worked

Financial activities such as:

Making bank deposits and checking bank statements

Paying bills and recording receipts and expenses

Figuring income taxes

WORK (OTHER THAN HOUSEHOLD)

11. School

School

Classes related to present or future employment

Include time spent in preparation for each of the above. For example, work or reading done at home or at the library relating to job or classes.

12. Paid

Paid employment and work-related activities, such as work brought home, professional, business and union meetings, conventions, etc.

Paid work for family farm or business, babysitting, paper route.

13. Unpaid

Work or service done either as a volunteer or as an unpaid worker for relatives, friends, family business or farm, social, civic, or community organizations.

NONWORK

14. Organization Participation

Attending and participating in:

Religious activities and services
Civic and political organizations
Other clubs and organizations

15. Social and Recreational Activities

Reading (other than required for school or work)
Watching TV
Listening to radio, stereo, etc.
"Going out" to movies, car shows, museums, sporting events,
concerts, etc.
Participating in any sport, hobby or craft
Taking a class or lesson for personal interest
Walking, cycling, boating, "taking a ride", training animals
Talking with friends or relatives, either in person or by
telephone
Entertaining at home or being entertained away from home
Writing letters, or cards to friends, relatives
Playing games, musical instruments, etc. (If adult is
playing with child, include such activities under non-
physical care).

PERSONAL MAINTENANCE

16. Personal Care (of Self)

Sleeping
Bathing, getting dressed, other grooming and personal care
Making appointments and going to doctor, dentist, beautician
and other personal services
Relaxing, loafing, resting
Meditation

17. Eating

Eating any meal or snack, alone, with family or friends at
home or away from home.

OTHER

18. Other

Any activity not classified in categories 1 to 17.
Any time block for which you cannot recall, do not know,
or do not wish to report.

APPENDIX C

TIME CHART

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APPENDIX E
INTEREST AND COMPETENCE SCALE

Part II. Place a check after each statement with which you agree with reference to the activity listed. You may check as many statements as you wish regarding a particular activity.

	Cooking	Cleaning House	Washing Dishes	Repairing Clothes	Physical Care of Child	Grocery Shopping	Paying Bills	Taking Out Garbage	Fixing Sink	Mowing Lawn	Maintaining Car	Helping Child With Homework
1. I get great pleasure out of doing this.												
2. I do this quite a lot and enjoy it.												
3. I feel as though I were a benefit to mankind while I am doing this.												
4. I like to do this because it is appreciated by other people.												
5. I think everyone should know how to do this.												
6. I like to do this pretty well.												
7. I like to do this because it isn't so exacting as other tasks.												
8. I like this only fairly well.												
9. My likes and dislikes for this about balance one another.												
10. Someday I might begin liking this.												
11. This is all right, but I wouldn't want to do it.												
12. To me this is more or less boring.												
13. I get out of doing this whenever I can.												
14. This is a useless way to spend one's time												
15. This benefits no one.												
16. I wish I had never heard of this.												
17. I absolutely refuse to do this.												

Part III. For the same activities listed above, rate your level of competence, using the following:

	Cooking
	Cleaning House
	Washing Dishes
	Repairing Clothes
	Physical Care of Child
	Grocery Shopping
	Paying Bills
	Taking Out Garbage
	Fixing Sink
	Mowing Lawn
	Maintaining Car
	Helping Child With Homework

- 5 -- Excellent
- 4 -- Very Good
- 3 -- Good
- 2 -- Fair
- 1 -- Poor