THE DETERMINANTS OF HOURS OF WORK OF LOW-INCOME FAMILY HEADS: A STATISTICAL ANALYSIS

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PREFACE

This dissertation is concerned with an empirical estimation of the supply of labor in terms of hours of work for low-income family heads. More specifically, the purpose is to estimate the relation between hours worked and sources and levels of income as well as hourly wages, controlling for the effects of other market and personal factors.

The study utilizes specified groups selected from the 1967 survey of Economic Opportunity data. The primary focus is on those family units who qualify for benefits under the provision of the proposed Family Assistance Plan; however, other groups are specified for comparative purposes.

The procedure basically is to estimate, using multivariate regression analysis, the supply relation for each of the various groups. Interactions and intercorrelations among the explanatory variables are explored.

This study would not have been possible without the cooperation and assistance of several individuals. It is to each of them that I owe a sincere debt of gratitude.

First, I am appreciative of the understanding, encouragement, and devotion of my wife, Joyce, and sons, Ben and Erik.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

This study is concerned with the effects on work effort of those benefits which can be set or adjusted by income maintenance programs.

Income Maintenance Programs

Existing programs related to income maintenance and public assistance make up a complex, uncoordinated and inadequate system. Many income maintenance programs were not designed for the purpose of alleviating poverty. Such federally sponsored programs as Old Age, Survivors, Disability, and Health Insurance (OASDHI) and the state-federal system of unemployment insurance provide benefits based primarily on prior taxable income rather than benefits based solely on a need criterion. The federally aided public assistance program, Aid To Families With Dependent Children (AFDC), is inadequate in the relief of poverty in terms of both individual coverage and adequacy of benefits, and in addition is believed to have adverse effects on work incentives.

The original intent and objectives of the AFDC program have changed over time and the program has been modified to reflect these changes.[1] Growing concern in Congress over the operation of the AFDC

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[1] A discussion of these modifications is found in the Manpower Report of the President, 1970, pp. 148-158.

program has been manifest in recent years. This political concern is largely due to mounting welfare caseloads, coexistent with a generally prosperous national economy, and the rising cost of the program.

The Nixon Administration's proposed Family Assistance Plan (FAP) was designed as an attempt to completely replace the AFDC program with new federal legislation. FAP thus generated increased interest and controversy concerning the appropriate provisions needed to alleviate poverty. FAP differs from existing programs in three respects: (1) a federally financed income guarantee is provided in an attempt to establish a minimal floor under the income of the eligible poor; (2) cash benefits are extended to include the currently excluded working poor; (3) provision is made for largely federal administration of the new program to assure its uniform application among the states.[2]

The Incentive Issue

All proposed income subsidy schemes are concerned with the problem of maintaining work incentives of the poor. Kesselman gives some reasons for concern with this problem:

> Several reasons account for the paramountcy of the incentives question in the treatment of this important public issue [income maintenance]. Of course, there are the purely economic reasons for concern--the cost of the program to the government and to society depend upon the degree of work curtailment under a subsidy scheme. If a maintenance program is to achieve its primary objective of raising low incomes, it must not allow its beneficiaries to reduce their earnings too much. And if the internal tax rate of a maintenance program must be kept low to avoid large disincentives to work, then the program will have to cover many of the non-poor as well. Longer-run and less crystallized economic

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[2]Glen C. Cain and Leonard J. Hausman, "The Family Assistance Plan: An Analysis and Evaluation," A policy statement of the National Manpower Policy Task Force Associates, Washington, D. C., April 17, 1970, p. 1.

> notions also enter into the feeling that a maintenance system should be designed so as not to discourage work on any substantial scale. It is widely held that the only long-run relief for the poor is their upgrading for absorption into the more highly productive parts of the economy. Beyond such economic reasoning looms a tacit realization that society is not eager to enact a program which allows the poor to receive public funds and yet work less [Puritan work ethic][3]

Zeckhauser and Schuck note that work incentive schemes serve at least two major social and economic purposes:

> First, work incentives, by reducing labor force defections, integrate the employable poor into the larger society and enchance its [society's] and their economic vitality. Second, work incentives, by subjecting the employable poor to the motivating force of higher wages, permit the labor market to allocate workers efficiently among firms, industries and geographical areas.[4]

Great care is being taken to assure Congress that any revision of federal statues to provide income transfers to poor families will include strong incentives to promote work-effort by (at least) recipient heads-of-household.

Problem: The Correlates of Work Effort

While there is much discussion about measures that are necessary to evoke desired levels of effort from potential recipients of government transfers, there is in fact a very meager understanding of the correlates of work effort. Static work-leisure choice theory suggests that the income and substitution effects associated with a change in the effective wage rate counteract each other, so the expected effect

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[3] Johnathan Kesselman, "Labor-Supply Effects of Income, Income-Work, and Wage Subsidies," Journal of Human Resources, IV:3 (Summer, 1969), pp. 275-276.

[4] Richard Zeckhauser and Peter Schuck, "An Alternative to the Nixon Income Maintenance Plan," The Public Interest, No. 19 (Spring, 1970), p. 122.

of (say) a wage subsidy on work effort cannot be determined a priori.

Consider the effect on work effort of a positive lump sum cash transfer combined with an increase in the effective tax rate, as exists in most negative income tax proposals.[9] The increased tax rate can be considered as a reduction in the effective wage rate. A wage rate reduction lowers the price of leisure relative to income. The income effect of this price change is to reduce the amount of leisure consumed (increase in work effort), while the substitution effect is to acquire more leisure because of its now lower relative price (reduction in work effort). The net effect of the increased tax rate on work effort is thus indeterminant.

The lump sum cash transfer produces an income effect that results in the increased consumption of leisure, provided leisure is considered a "normal" good. This leisure inducing income effect will be larger than the opposing income effect associated with the increased tax rate, since the tax rate is some percentage, such as 50 per cent, of the cash transfer. The net effect between the two income effects coupled with the substitution effect should lead to a reduction in work effort.

Intertemporal considerations have led both Boskin and Conlisk to suggest that the predictions concerning work effort associated with a positive lump sum cash transfer combined with a constant tax rate on earnings may be reversed with the passage of time.[10]

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[9]See Christopher Green, "Negative Taxes and Monetary Incentives to Work: The Static Theory," The Journal of Human Resources, III, No. 3 (Summer, 1968), p. 286-287.

[10]Michael J. Boskin, "The Negative Income Tax and the Supply of Work Effort," The National Tax Journal, XX (December, 1967), pp. 353-367, and John Conlisk, "Simple Dynamic Effects in Work-Leisure Choice: A Skeptical Comment on the Static Theory," The Journal of Human Resources, III.3 (Summer, 1968), pp. 324-326.

Little is known about the effects of positive marginal tax rates on work incentives. Since the marginal tax rate can be set independently of the level of the cash transfer, it is important to have some knowledge of the income and substitution effect of a tax (wage) rate change. These effects are estimated in this study.

Informed decisions about appropriate income transfer programming cannot be made without a better understanding of the price-work effort relation. The current experimental income transfer program being conducted in Pennsylvania and New Jersey by Mathematica-Princeton and The Institute for Research on Poverty - University of Wisconsin, will provide the first direct test of the work-effort effect of alternative tax-transfer schemes. It will be several years before the data from this experiment can be analyzed and applied to public policy programming. There is such an air of urgency at the legislative level that it is almost certain that a tremendous amount of public sector money will be spent before these insights are gained.

This study will provide insight to the work incentive issue by estimating the supply relation in terms of hours worked per year, for selected groups of low-income family heads. As Bowen and Finegan note in the introduction to their recent definitive analysis of labor force participation, "labor supply depends of course on the degree of labor force participation, as reflected in annual hours worked, as well as on the number of individuals participating in the labor force at a point in time...."[11]

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[11]William G. Bowen and T. Aldrich Finegan, The Economics of Labor Force Participation, Princeton University Press, 1969, p. 3.

The proposed extension of benefit coverage under FAP to include the working poor would mean that decisions concerning work effort will probably concern hours of work rather than a work participation decision.

> It is noteworthy that almost half of the poor people in the United States are members of families with children with an able-bodied male head less than 65 years of age; that nearly sixty per cent of the latter group is poor despite the fact that the breadwinner holds a full-time, year-round job; and that among most of the remainder, the head works part-time the entire year or full-time for part of the year.[12]

Three basic models have been employed to analyze variations in hours of work. Studies have approached the problem from a demand[13] or supply[14] perspective, or have attempted a simultaneous determination of wages and hours via the forces of demand and supply.[15]

Since, as Rosen observed, ". . . the observational units whose behavior is to be explained determine the most appropriate model design,"[16] the approach selected for this study dealing with household

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[12]Cain and Hausman, p. 3.

[13]See Ronald G. Ehrenberg, "The Short-Run Employment Decision and Overtime Behavior in U. S. Industry, 1966," (unpublished Ph.D. dissertation, Northwestern University, 1970); Sherwin Rosen, "Short-Run Employment Variations on Class-I Railroads in the U. S. 1947-63," Econometrica, XXXVII (July, 1968), pp. 511-529; and Nadiri and Rosen, "Interrelated Factor Demand," American Economic Review, LIX (September, 1969), pp. 457-471.

[14]Since the approach adopted in this study is of this type, the related literature is cited in the following chapter.

[15]See Sherwin Rosen, "On the Interindustry Wage and Hours Structure," Journal of Political Economy, LXXVII (February, 1969), pp. 249-273; and S. Black and H. Kelegian, "A Micro Model of the U. S. Labor Market," Princeton University Working Paper No. 10 (September, 1968).

[16]A preliminary draft of Rosen, dated October 12, 1967, cited by Ehrenberg, p. 12.

heads of low-income families is based on a modified version of traditional income-leisure theory.

An implicit assumption of this approach is that the demand for hours of work per worker is infinitely elastic. In other words workers choose the quantity of hours they desire to work at a given wage rate. The validity of this assumption is explored in Chapter II.

It should be noted that similar restrictive assumptions are necessary concerning supply aspects for empirical analysis in studies dealing only with demand factors. The demand approach was not selected because of the conceptual difficulty associated with the demand for individual hours of work.

Thesis Format

This dissertation uses available data from the 1967 OEO Survey of Economic Opportunity on low-income families, and a variant of Marvin Koster's widely adopted market-nonmarket choice model, to estimate the relation between hours worked and sources and levels of income as well as other market and personal factors. The supply relation will be estimated by means of multivariate regression analysis using the disaggregated cross-section survey data.

The conceptual basis for the analysis of hours of work supplied to the market is presented in Chapter II. This presentation is followed by a theoretical discussion of the variables specified in the model and the problems and limitations associated with the model.

The data and editing procedures are described in Chapter III. This study is concerned only with the civilian, nonfarm, low-income interview units whose head was a wage earner. Four samples were separated

for analysis: working poor families with children (FAP sample), working poor families and unrelated individuals without children (WP-WC), working near-poor families with children (WNP-C), and working near-poor families and unrelated individuals without children (WNP-WC). A detailed discussion of the measures available in the data and of the measures selected for the empirical analysis is also located in this chapter.

The results of the empirical analysis are reported in Chapter IV. Multivariate regression analysis was employed to estimate the supply relation for each of the four samples previously mentioned. Within each sample separate regression equations were estimated for families grouped into the following categories: Worked full-time both weekly and hourly (FWFH); worked full-time weekly, part-time hourly (FWPH); worked part-time weekly, full-time hourly (PWFH); worked part-time both weekly and hourly (PWPH). The finding of the interaction implicit in the separation according to these categories is of significance.

The effects of intercorrelations and interactions of selected variables on the wage and income terms were explored. Intercorrelations involving either wage or income terms with other selected explanatory variables were considered minor in most cases, especially for the FAP and WNP-C samples. Selected results based on regressions specified to include interaction terms for each group in the various samples are also reported. The significant interactions provide evidence concerning the different pattern of wage and income effects associated with various demographic factors.

Market variables were considered in exploring demand related aspects; however, the results in terms of significant estimates were

not of consequence and these variables were dropped from the final regressions.

Significant findings and implications for manpower policy are presented in the final chapter. The chapter includes comparisons of work incentives among the various groups tested associated with income maintenance program provisions.

CHAPTER II

THEORETICAL MODEL AND DISCUSSION OF VARIABLES

Introduction

This chapter provides a theoretical basis for an analysis of hours of work supplied to the market by low-income individuals. No claim of originality for this theoretical formulation is intended.

The development of the theoretical model leads to the specification of a labor supply equation applicable to cross-section data using individual and family unit observations. All variables are discussed in their theoretical context. The identification problem and some limitations and problems associated with the use of cross-section data are also explored. Various restrictions inherent in the model as developed for regression analysis are enumerated in a concluding section.

Becker's Theory of Time Allocation

Two complementary theories of time allocation are found in the economics literature; one being a less inclusive subset of the other. The more general theory, formalized by Gary Becker, treats the cost

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[1]Gary S. Becker, "A Theory of the Allocation of Time," Economic Journal, LXXV (September, 1965), pp. 493-517. Many of the ideas developed by Becker originated from Jacob Mincer's study, "Labor Force Participation of Married Women," Aspects of Labor Economics, NBER volume (Princeton, 1962), pp. 63-97.

of time on the same level as the cost of market goods.[1] The less inclusive theory is the traditional work-leisure choice theory which has been developed and refined by several writers.[2] According to the traditional theory, families maximize utility functions of the form,

$$U = U\ (y_1,\ y_2,\ \ldots y_m), \tag{1}$$

where the y_i are market goods and leisure is treated as one of these goods, subject to the budget constraint,

$$p_i y_i = Y = E + V, \tag{2}$$

where the p_i are market prices of these goods, Y is money income, E is earnings income, and V is other income.

In Becker's formulation time and market goods are inputs in the production of basic commodities, which are then combined to maximize family utility. This can be written as

$$Z_i = f_i\ (x_i,\ T_i)\ (i = 1,\ \ldots,m), \tag{3}$$

where Z_i commodities are produced by a vector of market goods x_i and a vector of time inputs T_i. A vector of time inputs is necessary since the opportunity cost of time varies according to the time period considered. It is assumed that all commodities require both time and market goods inputs, but in varying proportions.

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[2]For a development of traditional theory, see Franklee Gilbert and Ralph W. Pfouts, "A Theory of the Responsiveness of Hours of Work to Changes in Wage Rates," Review of Economics and Statistics, XL (May, 1958), pp. 116-121.

Having produced these basic commodities, through the production functions (f_i), families also choose among them to maximize utility,

$$U - u(Z_1, \ldots Z_m) - u\,(f_1, \ldots f_m) = U\,(x_1, \ldots x_m; T_1, \ldots T_m), \tag{4}$$

subject to the resource constraint,

$$Z = g\,(Z_1, \ldots Z_m), \tag{5}$$

where g is an expenditure function of Z_i, and Z is the resource or budget constraint.

Since Z is a function of Z_i, Z is also a function of both time and market goods. It is necessary that Z be a joint constraint of time and goods because time can be converted into goods by reducing the time spent at consumption ($T_c = \sum_{i=1}^{m} T_i$) and increasing the time at work (T_w), assuming that total time (T) is equal to $T_c + T_w$. The combined constraint can be written as

$$\sum_{i=1}^{m} p_i x_i + \sum_{i=1}^{m} T_i W = V + TW, \tag{6}$$

where W is the money wage rate.

By rewriting the production function (3) in the form

$$\begin{aligned} T_i &= t_i Z_i \\ x_i &= b_i Z_i, \end{aligned} \tag{7}$$

where t_i is a vector of time input and b_i is a vector of goods input per unit of Z_i, equation (6) becomes

$$S' = \sum_{i=1}^{m} \pi_i Z_i,$$

$$\text{letting } \pi_i = p_i b_i + t_i W \tag{8}$$

$$\text{and } S' = V + TW.$$

The consumption of commodities is thus maximized subject to a budget constraint where the cost of commodities is the sum of the cost of direct market goods inputs and the indirect cost of productive time foregone.

If W is assumed constant and if there are constant returns in producing Z_i, so that b_i and t_i are fixed for given p_i and W, maximizing family utility subject to the budget constraint gives

$$\text{Max}U_i = \frac{\partial U}{\partial Z_i} = \lambda \pi_i, \tag{9}$$

for i - 1, . . .m, where λ is the marginal utility of money income.

If W is not constant and if marginal wage rates are less than average wage rates, then S' overstates the budget constraint. This problem led Becker to introduce the concept of <u>full</u> income, S, which is the maximum money income available,

$$S = L\ (Z_1, \ . \ . \ .Z_m) + Y\ (Z_1, \ . \ . \ .Z_m) \tag{10}$$

where Y is money income and L is foregone money income. Both Y and L are functions of the Z_i because the decision to produce or consume depends on the commodity set selected. Full income is either spent on

market goods or is "spent" on foregone earnings, as stated by the equation

$$S = \sum p_i b_i Z_i + L\ (Z_1, \ldots Z_m). \tag{11}$$

Even with the budget constraint in the more general form, a separation of total marginal prices into both direct and indirect components may be possible under certain conditions. The equilibrium conditions resulting from maximizing the utility functions subject to (11) may be written as

$$U = T \left[b_i (p_i + c_i) + t_i l_i \right] \tag{12}$$

The marginal cost of Z_i is the sum of $b_i\ (p_i + c_i)$ and $t_i l_i$, where c_i is the marginal foregone earnings of using more goods on Z_i, and l_i is the marginal foregone earnings of using more time on Z_i. Only if $c_i = 0$ is the direct-indirect cost dichotomy valid. In the analysis that follows, it is assumed that $c_i = 0$, and b_i and t_i are constant (fixed factor proportions). Under these assumptions, $b_i p_i$ is the marginal cost associated with using goods while $t_i l_i$ is the marginal cost of using time in the production of Z_i.

Becker applies this theoretical framework to the determinants of hours worked by considering the effects of earnings, income, and market prices on T_c, and therefore residually on T_w, since $T - T_c = T_w$. Define the relative marginal importance of foregone earnings as

$$\phi_i = \frac{l_i t_i}{p_i b_i + l_i t_i} \tag{13}$$

where:

l_i = foregone earnings per hour,

t_i = number of hours used per unit of Z_i,

p_i = market price of goods,

b_i = number of goods per unit of Z_i.

Define the relative marginal importance of time as

$$\gamma_i = \frac{t_i}{p_i b_i + l_i t_i} \tag{14}$$

Commodities with smaller values for ϕ and γ are preferred for consumption over those with larger values. The marginal importance of foregone earnings will be greater the larger the amount of time used per unit of Z_i (t_i) and the larger the cost (foregone earnings) per unit of time (l_i). The higher the values of p_i and b_i, the smaller the size of both ϕ_i and γ_i. Finally, γ_i will be larger, the greater the value of t_i. Only if l_i were the same for all commodities could the importance of foregone earnings be determined by only time intensity.

The foregoing model can be used to explain traditional income and substitution effects. Suppose full income (S) increases due to an increase in nonearnings income (V), relative commodity prices remaining unchanged. The consumption of most commodities will be increased since the budget constraint (S) is larger. If the consumption of all commodities increases, T_c would increase since $T_c = \sum_{i=1}^{m} t_i$ and m, the number of commodities, increases. This income effect would result in a decrease in hours worked because $T_w = T - T_c$.

Only if commodities for which γ is high were inferior could T_w increase.

Next, consider the effects of a compensated increase in earnings (the substitution effect). The effect of a rise in earnings (W) is fully compensated by a decline in nonearnings income. The increase in W would increase foregone earnings per hour (l_i) uniformly for all commodities; however, relative prices would change because t_i varies among commodities. There would be a greater increase in $l_i t_i$, and therefore in ϕ_i, for time-intensive commodities. Thus, a compensated increase in earnings would result in a substitution of goods-intensive for earnings-intensive commodities, ($l_i t_i$), and since earnings and time intensity (t_i) are normally positively correlated unless l_i and t_i are strongly negatively correlated; this means that T_w would increase and T_c decrease. If $l_i t_i$ and t_i were negatively correlated, a compensated increase in W would result in a substitution toward time-intensive commodities resulting in an increase in T_c and a reduction in T_w.

An uncompensated increase in earnings would result in a combination of the income and substitution effects discussed above, so the net effect on T_w is indeterminate <u>a priori</u>.

A Comparison of the Becker and Work-Leisure Theories

The results associated with an increase in nonearnings income and an increase in both the compensated and uncompensated earnings cases are consistent with traditional work-leisure (W-L) analysis; however, the W-L theory, in which the cost of all other commodities

is only market goods, is a special case of Becker's more general approach. As a description of reality the W-L approach is not tenable since all commodities require a time input.

Becker also recognizes the interdependency in the allocation of time among commodities for various persons within a family. Each person's allocation of time depends on his productivity in both the market and nonmarket sectors compared with those of the other family members. Each member would tend to specialize at the task in which he is relatively more efficient.

The difficulty in distinguishing leisure from other forms of nonwork activity, and even nonwork from work activity is solved by using Becker's approach since all the traditional results can be reached without introducing the concept of leisure. Becker reaches all the traditional results by stressing that commodities differ in the relative importance of time.

A shortcoming of Becker's theory is associated with the empirical testing of the model, which requires knowledge of the rate of transformation of time into money income (market goods) and into nonmarket goods.[3] Although not currently available, perhaps as Becker mentions, ". . . agencies that collect information on the expenditure of money income might simultaneously collect information on the 'expenditure' of time."[4]

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[3]William G. Bowen and T. Aldrich Finegan, The Economics of Labor Force Participation (Princeton, 1969), p. 570.

[4]Becker, p. 517.

A Hybrid Model for Empirical Specification

The model used in this study incorporates both the concepts developed by Becker and elements of the W-L approach. The full, or potential, income concept is utilized while the concept of leisure as a unique commodity having special properties is avoided.

The primary reason for adopting this hybrid model is that it allows specification of a cross-section labor supply relation. Shortcomings and limitations of this approach will be presented after the model has been formally developed.

The family labor supply model adopted here follows that of Marvin Kosters in most dimensions.[5] The family, which is the unit of analysis, determines who works, the number of hours worked, and the length of employment.

The variables and corresponding symbols used in the development of the model are:

Y = total income available to the family, $Y = Y_m + V$.

Y_m = market money income.

V = income from nonemployment sources accruing to the family during the period defined for T.

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[5]The following mathematical development paraphases the presentation in Marvin Kosters, "Income and Substitution Parameters in a Family Labor Supply Model," (P-3339, the RAND Corporation, December, 1966). Also see his paper, "Effects of an Income Tax on Labor Supply," (P-3757, the RAND Corporation, January, 1968).

Helpful insights into the mathematical development that follows are found in an unpublished paper by C. Russell Hill, who is currently doing research at the University of Michigan on the determinants of labor supply of the urban poor.

T = total number of hours per person available to be spent in in labor market activity and nonmarket activity in the time period considered.

T_{ni} = time spent in nonmarket activity in hours by the $i^{\underline{th}}$ person. Although T_n can be interpreted as leisure time, it should be interpreted, according to Becker, as time spent at consuming commodities (Z_1, . . .,m) which is determined by the relative marginal importance of foregone earnings per unit of Z.

L_i = labor supplied by the $i^{\underline{th}}$ person in hours.

p_3 = price of after-tax money income; the number of dollars worth of time spent in nonmarket activity, which is evaluated at gross wage rates, that must be given up for one dollar's worth of after-tax market income. (p_3 is assumed equal to unity.)

W_i = wage rate in dollars per hour for the $i^{\underline{th}}$ person.

i = 1 or 2 for the family head (husband, where present) and spouse respectively.

F = full or potential income.

Z = commodities that are consumed by the family.

The general model developed here assumes that the family unit contains only two persons (husband and wife) who are potential providers of some market time, and each of whom has the following time constraint:

$$T = T_{ni} + L_i \quad (i = 1,2). \tag{15}$$

The family has a given amount of income from nonemployment sources and income from employment which is available to be spent on consumption

goods. The budget constraint may be written

$$Y = V + W_1 L_1 + W_2 L_2. \tag{16}$$

Total family income is not the appropriate income concept relevant for the allocation decision of the family member's time between market and nonmarket activity. Total family income reflects decisions that have already been made concerning labor-force behavior rather than serving as a determinant of labor-force behavior. Full or potential income is a more appropriate income concept. Full income is obtained by determining the total value of time for each family member and adding income from nonemployment sources. An individual's total time (T) is evaluated by assuming his wage rate is applicable to both the market and nonmarket components of time. Full income may be written as:

$$F = V + \sum_{i=1}^{2} T_i W_i. \tag{17}$$

The budget constraint may be written as:

$$F = p_3 Y + T_{n1} W_1 + T_{n2} W_2. \tag{18}$$

It is assumed that families maximize utility functions of the form,

$$U = U (Y, T_{n1}, T_{n2}) \tag{19}$$

subject to the budget constraint (18). It is assumed that the family's utility function is a monotonic increasing function of the family's preference ordering, everywhere differentiable, and has the proper

convexity.[6]

Applying the Lagrangian multiplier technique, λ, and differentiating,

$$U(Y,T_{n1},T_{n2}) - \lambda \left[p_3 Y + T_{ni} W_1 + T_{n2} W_2 - T(W_1 + W_2) - V \right] = 0 \qquad (20)$$

the necessary conditions for a constrained maximum are obtained:

$$U_i - W_i = 0 \quad (i = 1,2)$$

$$U_3 - p_3 = 0 \qquad (21)$$

$$p_3 Y + T_{n1} W_1 + T_{n2} W_2 = V + T\ (W_1 + W_2).$$

where $U_i = \frac{\partial V}{\partial T_{ni}}$ $(i = 1,2)$ and $U_3 = \frac{\partial V}{\partial Y}$. Sufficiency is assured by the assumption of the form of the utility function. This assumption also allows Y and T_{ni} to be treated as differentiable functions of p_3, W_i, V and T.

The paritals of T_{n1}, T_{n2} and Y with respect to the implicit variables are solved using Cramer's Rule, where the solutions are stated in utility terms and the interdependency of T_{n1}, T_{n2} and Y are taken into account.

Through appropriate substitutions, the solutions for the partial derivatives of quantities with respect to prices in terms of income derivations, $\frac{\partial T_{ni}}{\partial V}$ and $\frac{\partial Y}{\partial V}$, and income compensated price derivatives, $\frac{\partial T_{ni}}{\partial W_j}$ and $\frac{\partial Y}{\partial W_j}$ can be obtained. A first order approximation to changes in labor supply may be written as:

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[6]These assumptions were made explicit by Hill.

$$dT_{ni} = \sum_{j=1}^{2} \frac{\partial T_{ni}}{\partial W_j} W_j + \frac{\partial T_{ni}}{\partial V} dV \quad (j \text{ and } i = 1,2) \tag{22}$$

Substituting the income and substitution derivatives into equation (22), noting that $L_i = T - T_{ni}$, a first-order approximation to changes in labor supply may be written as:

$$dL_i = (\tilde{L}_1 \frac{\partial L_i}{\partial V} + S_{i1})\, dW_1 + (\tilde{L}_2 \frac{\partial L_i}{\partial V} + S_{i2})\, dW_2 + \frac{\partial L_i}{\partial V} dV. \tag{23}$$

Integration of equation (23) yields the following supply equation, which is the basic equation for analysis:

$$L_i = a_i + (\tilde{L}_1 \frac{\partial L_i}{\partial V} + S_{i1})\, W_1 + (\tilde{L}_2 \frac{\partial L_i}{\partial V} + S_{i2})\, W_2 + \frac{\partial L_i}{\partial V} V, \tag{24}$$

where i - 1, 2 for husband and wife respectively

a = constant of integration.

$\tilde{L}_i$ = fixed equilibrium values of L_i which are determined by the utility maximizing conditions for given wage rates and nonemployment income.

$\frac{\partial L_i}{\partial V}$ = income effect. As Becker has shown, this term is negative if relatively time intensive commodities are considered "normal" goods.

W_i = wage rate for i = 1, 2.

$S_{ij} = \frac{\partial L_i}{\partial W_j} - L_j \frac{\partial L_i}{\partial V}$ = an income compensated wage rate effect (j and i = 1, 2 for husband and wife respectively).

V = income from nonemployment sources.

Equation (24) states that the number of hours supplied to the market by a given individual depends on his wage rate, the wage rate of his spouse and income from nonemployment sources.

In the case where $i = j$, S_{ij} is an own price derivative which means that it is an income compensated wage rate effect associated with the given individual's <u>own</u> wage rate. This is a pure substitution effect and its algebraic sign is therefore positive.

For the case where $i \neq j$, S_{ij} is an income compensated cross price derivative. The wage rate that is utilized in this case is that of the individual's spouse. The algebraic sign is negative if the husband and wife's nonmarket time are substitutes and positive if they are complements.

The labor supply equation may be written in log-log (elasticity) form which assumes that the underlying structural relationship between the dependent and explanatory variables is curvilinear. The desirable aspect of the regression in logaritmic form is that the coefficient of the explanatory variables are equivalent to elasticities. The supply relation was not estimated in logaritmic form since many of the explanatory variables, including the income variable, have observations with zero or negative values. This problem may be overcome by using the arithmetic values for variables which have zero or negative observations; however, it should be noted that a different structural relation results.

Discussion of Variables

A desirable characteristic of these equations is that the labor supply equation is specified in terms of wage rates, labor supplied, and income from nonemployment sources; variables on which data can be obtained. The purpose of this section is to discuss these variables in greater detail as well as to suggest other variables which are necessary to consider for proper specification and identification of the model.

Dependent Variables: Hours Worked

The decision to work (to allocate time to market activity) may be viewed as involving at least two choices. First, there is the choice of whether or not to seek market employment. The decision to seek such employment designates the subject as a "labor force participant," using current terminology, even if he is not successful in finding a job. The second choice is the number of hpurs of work a person is willing to accept per time period.

The decision to seek (or hold) a job has received wide professional attention; therefore, discussion of this aspect of labor supply will not be included in this study.[7]

Equilibrium Hours. Ideally, the information that is desired is a measure of the equilibrium number of hours individuals in low-income families would be willing to offer at alternative price (wage) levels,

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[7] The most recent culmination of work in this area is the previously cited work by Bowen and Finegan. Other references relating to to this aspect of labor supply are cited there.

ceteris paribus. More specifically, as Kosters states,

> A comprehensive study of labor supplied would require information on the number of hours of work, standardized for intensity of effort, supplied during a person's lifetime given permanent measures of the market earning power and income from other sources of the persons in the consumer unit of which he is a member.[8]

The term "equilibrium number of hours" raises the question,

> To what extent is it reasonable to suppose that mean hours worked by...groups of individuals represents an approximation of the equilibrium choices of hour by individuals responding to their opportunities (i.e., real wage rates), given their other economic circumstances?[9]

The relation between average weekly hours and the wage rate is examined in this study by using data on individuals at a moment in time. It should be noted that it is the average relationship that is being measured in dealing with data of economic behavior; therefore, individual observations are expected to deviate from the average.

Do these data reflect hours largely imposed on workers by various factors such as demand, technological and legal constraints? It is not obvious that these factors are likely to dominate in the determination of average hours of work during a given time period. Restating the question, does an incorrect average relationship between opportunities (e.g., real wage rates) and desired hours of work per time period by workers result because of failure to consider demand, technological, and legal constraints? Whether or not the measured estimate will be a biased estimate of a supply curve depends on the relation of

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[8]Kosters, "Income and Substitution Effects in a Family Labor Supply Model," p. 22.

[9]Belton M. Fleisher, Labor Economics: Theory and Evidence, Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1970, pp. 59. The discussion of this point is drawn largely from this source.

the omitted factors to the principle explanatory variable (wage rate). If the omitted variables are correlated with the wage rate, the relationship between weekly hours of work and wage rates will be a biased estimate of a supply curve. It is possible that the bias resulting from positively correlated excluded variables may be partially or wholly offset by negatively correlated excluded variables. It is assumed, for lack of information, that the omitted factors are not correlated with the explanatory variables; therefore, a biased estimate is assumed not to be obtained.

This treatment of the equilibrium issue is clarified by Ehrenberg.[10] Hours of work can be divided into two components, its equilibrium component (L*) which is explained by the vector of explanatory variables derived from the theoretical model (X*), and its disequilibrium component (L^d) which is explained by a set of unobserable variables (X^d). Suppose that the true relationship is

$$L_n = L_n^* + L_n^d = (X_n^*)'\beta + (X_n^d)'\theta + e_n \qquad e \sim n\ (0,\sigma^2 I), \tag{26}$$

where (β) and (θ) are the vector of regression coefficients associated with (L^*) and (L^d) respectively. For each individual, only (L) and (X^*) are observable.

> However, a well-known theorem states that if the omitted variables (X^d) are uncorrelated with any of the remaining explanatory variables (X^*), then regressing the dependent

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[10] Ronald Gordon Ehrenberg, "The Short-Run Employment Decision and Overtime Behavior in U. S. Industry, 1966" (unpub. Ph.D. dissertation, Northwestern University), pp. 88-89. This development follows his exactly except that the discussion is in terms of different variables.

> variable [L] or the remaining explanatory variables (X^*) will yield an unbiased estimate of their coefficients (β).[11]

Explanatory Variables

Each explanatory variable indicated in equations (24) and (25) will be discussed along with other variables incorporated in the ceteris paribus assumption of the model. The format will be to present the concept, the rationale for using it, and its expected relationship to the dependent variable (hours of work).

Wage rate (W_i). The market earnings rate (wage rate) concept as used in this study is an hourly rate associated with individual family members. This market wage variable for a given individual gives his money payoff to time spent in market activity, or the opportunity cost of an hour of nonmarket activity. The market wage is only a partial measure, however, of opportunity cost since it does not encompass all elements of compensation and cost related to a given job.

Ideally, the wage rate should be in real terms accounting for changes in prices as well as levels of fringe benefits and cost associated with working. Problems associated with the measurement of fringe benefits and job related costs preclude their consideration in this study. Costs associated with the job may be of more concern to low-income persons than are fringe benefits. Prices are assumed constant because of the cross-sectional nature of the study.

Unlike studies dealing with labor force participation, in studies

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[11] Ibid., p. 89.

concerned with hours of work the wage rate variable has a known rather than only an expected value. This is not to imply that expectations are irrelevant in the latter type of study. Robert Lucas and Leonard Rapping have indicated that a household's current labor supply decisions may well depend on current wage rates adjusted for the expectations about what will happen to that rate over time.[12]

The simplifying assumption is made that either expected wage rates equal current wage rates for the employed poor or that their expected and current wage rates are positively related. Under these assumptions, current wage rates may be considered as the appropriate wage concept for purposes of analysis.

It can be argued that a negative relation between expected and current wage rates exists. In this case, an individual accepts a job with lower intital wage than he would otherwise have taken because he anticipates greater wage increases over time. Considering the type jobs available to the low-income individuals and their limited vertical job mobility, it seems doubtful that the case is relevant for this group of individuals.

The unemployed, on the other hand, do not have jobs; therefore current wage rates for a given job are not directly applicable to them. The labor supply decision facing these individuals is one of participation, thus wage considerations must be in terms of expected values.

The wage rates for both the husband and spouse are considered for

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[12]Robert E. Lucas, Jr. and Leonard A. Rapping, "Real Wages, Employment, and Inflation," Journal of Political Economy, LXXVII (September/October, 1969), pp. 726-29.

the following reason:

> The distribution of leisure, nonmarket work, and market work among family members depends on relative prices (wages) within the family specific to individual members, as well as on cultural or legal restraints or biological specialization of function. Earning powers of individual family members and marginal productivities in alternative pursuits differ among family members and this set of relative prices (wages) should affect the pattern of activity to which individual family members allocate their time.[13]

The correlation of an individual's wage rate, as well as the spouse's wage rate, to own hours of work is indeterminant since each incorporate both a positive substitution effect and a negative income effect.

Income from Nonemployment Sources (V). It is crucial in estimating income and substitution effects that family income from sources other than earnings be a significant component of total family income for at least some families.[14] This is necessary because variation in family income independent of earnings can occur only to the extent that income is composed of something in addition to earnings.

A negative association is expected between V and hours of work due to a pure income effect. Using Becker's terminology, as more commodities (Z) are purchased, additional time inputs are allocated to consumption of Z, therefore less time is available for market activity (work).

Tastes. Taste factors are assumed to be held constant in the development of the mathematical model; however, tastes are not assumed

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[13] Kosters, "Income and Substitution Effects in a Family Labor Supply Model," p. 7.

[14] Ibid., p. 20.

to be identical among families represented in cross-section data.

The taste variables of major concern might be classified into three groups: (1) taste for money income, (2) taste for market work per se, and (3) taste for nonmarket work.[15] Consideration will be given to the variables in each of these groups.

(1) Taste for money income. Family size as well as the levels of both indebtedness and net assets may be correlated with taste for money income.

Michael Boskin indicates that the work effort of poor individuals may be positively associated with the level of indebtedness. This positive correlation may occur because "making payments will commit the worker to a continued stream of income . . ."[16] A negative correlation may exist between the level of indebtedness and work effort, however, if the debt was incurred due to the purchase of time intensive consumption goods.

Another aspect of taste for money income may be the net worth or net asset position of the family. The relation between hours worked and net worth is such that:

> If family units which supply labor are net (physical and money) asset holders...the quantity of labor supplied at alternative wages would tend to vary inversely with the level of real assets held by workers, ceteris paribus.[17]

It is possible for a family with assets to choose not to work or

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[15] See Bowen and Finegan, p. 20.

[16] Michael Boskin, "The Negative Income Tax and the Supply of Work Effort," National Tax Journal XX, (December, 1967), p. 363.

[17] Hirschel Kasper, "Assets and the Supply of Labor: A Note," Southern Economic Journal XXXIII, (October, 1966), p. 246.

to work fewer hours and to maintain consumption standards by liquidating these assets in the absence of income from other sources. The length of time for which this alternative is possible depends, of course, on the net changes in the family's net worth position.

Another possible explanation for an association between the level of net assets and hours worked is that the family may aspire to a target level of assets.[18] Assets would be a consumption good and as more assets are acquired (consumed), the marginal utility of acquired assets would decline once the target level is reached, if diminishing returns had not already begun. Associated with the reaching of this target asset level is the increased consumption of commodities other than assets. Since commodities have a time component as well as a goods component, less time will be allocated to market activity. Thus, an inverse relation between hours worked and the level of net assets is expected based on Kasper's consideration as well as the target asset level hypothesis.

It should be noted that collinearity problems may arise between net assets and nonearnings income (V). Generally, it would be expected that the larger the proportion of monetary return yielded by assets, the higher would be the correlation between net assets and nonearnings income. This point will be specifically dealt with in the next chapter; however, it would be expected intuitively that the problem would be minor for low-income families.

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[18]Although the section here was developed independently, see Karl Egge, "Intercolor Differences in Labor Supply Among Older Men" (Paper presented at the Winter Meetings of the Econometric Society, New York, December 30, 1969), p. 23.

Given the number of wage earners, the larger the size of the family the greater is the need (taste) for money income. This would mean a positive correlation between family size and hours of work should be observed.

(2) Taste for market work per se. Factors such as color, health, education, and marital status may reasonably be expected to affect the taste for market work per se.

A difficulty associated with the use of color as a taste variable is that color may also be a surrogate for other factors. On the one hand, color may reflect differences in employment opportunity due to discrimination; while on the other, color may reflect taste or attitude differences toward work effort. Nonwhites are expected to work fewer hours per year than whites.

Health factors have been found to be among the more important influences on a family's taste for market work. As stated by Bowen and Finegan, the health variable measures the "pain cost" associated with various types of market activity.[19]

Karl Egge, in some preliminary work, found that the health variable had the highest explanatory power of the variables examined. The health measure used in Egge's study is whether or not the person has a work-affecting health problem which limits the kind or the amount of work he can perform or prevents him from working altogether.[20] Poor health is expected to be associated with fewer hours of

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[19]Bowen and Finegan, p. 22.

[20]Egge, p. 24

work. Egge states

> Because it limits his freedom to "choose" between work and leisure, poor health affects an individual's expected wage rate in future time periods, disrupts his retirement plans, affects his life expectancy, and acts as a type of technological constraint on the number of hours he can work.[21]

It is possible that "cross effects" may be important in dealing with the health variable. An individual's choice of hours of work may depend on his spouse's health as well as his own. As noted by Hill, poor health of the spouse may lead an individual to work either more due to monetary considerations or less if nursing care is required.[22]

Education probably also affects taste for market work. Two reasons may be given for this association: First, educational attainment may increase the enjoyment of work or enable the individual to work in jobs that are more satisfying; and secondly, the opportunity cost associated with staying out of the labor force is greater, the higher the level of education.[23] The second factor should result in a positive partial correlation between hours and schooling when other factors are held constant.

There should also be a positive correlation between the taste for market activity and the taste for education because investment in education can yield a monetary return only if the individual engages in

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[21] Ibid.

[22] Hill

[23] T. Aldrick Finegan, "Hours of Work in the United States: A Cross-Sectional Analysis," Journal of Political Economy, LXX (October, 1962), p. 454.

market activity. This is unlike other forms of investment which yield a monetary return independent of the hours worked by the individual.[24]

(3) Taste for nonmarket activity. The number of children in a family and taste for nonmarket activity are expected to be negatively correlated for family heads. This would give a positive relation between the number of children and hours worked by the family head. Hours worked in market activity by married women may, however, be negatively related to the number of children; thus, the net effect of the number of children on total family hours of work is indeterminant. The sex variable should control for the taste for unpaid work in the home. Females, having greater taste for homework, would thus be expected to supply fewer hours per year than males. The taste for nonmarket activity is expected to be greater among both the older as well as the younger age groups; the older group because of grown families and accumulated wealth, the younger group because of greater vitality and out-of-doors orientation of activities.

The difficulty in controlling for these taste factors is evident. It is hoped that such an inadequate control over tastes will only result in a smaller R^2 of the regression and will not affect the estimates for the coefficients of the explanatory variables.[25] This means that unbiased estimates can be obtained provided the excluded variables are uncorrelated with the variables included in the regression equation.

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[24] Ibid.

[25] Glen Cain, Married Women in the Labor Force, (Chicago, 1966), p. 26.

Market Variables

Generally, the maintained hypothesis concerning the process which generates the data used in studies of labor supply is simply the equilibrium results of the interaction of demand and supply. "Each observation," M. S. Feldstein notes, "represents the intersection of one particular supply curve and the corresponding demand curve..."[26]

It is not difficult to visualize a process where shifts in the supply curve are so large relative to shifts in the demand curve that the resulting scatter of observations thus generated resembles a demand curve more closely than a supply curve. This type of bias is referred to as the "identification" problem because when it exists a regression line cannot be properly identified as being either a supply curve or a demand curve.[27]

In order to overcome the identification problem, variables in addition to wage rates and hours worked must be included in the equation to account for shifts of the supply curve between different observations.[28] The demand equation need not be estimated, although it must be specified to include at least one exogeneous or predetermined variable not in the supply equation.

Next, consider the discussion of the identification problem in

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[26]M. S. Feldstein, "Estimating the Supply Curve of Working Hours," Oxford Economic Papers, XX (March, 1968), p. 75.

[27]Fleisher, p. 31.

[28]Feldstein, p. 77.

[29]See A. C. Rayner, "On the Identification of the Supply Curve of Working Hours," Oxford Economic Papers, XXI (July, 1969), p. 294.

connection with cross-section data on individuals and consider the process whereby these observations are generated. A difficulty arises in attempting to conceptualize the demand facing an individual worker. In confronting this problem, the question becomes whether or not hours of work associated with various wage rates as reflected in the data are observations which can be interpreted only as measures of labor supply.

If it is assumed that the data reflect equilibrium choices as to individual decisions between market and nonmarket activity, then the individual must be at the frontier of his supply curve. It is assumed that observations will not lie to the right to the individual's supply curve because the supply curve is a frontier concept. Neither will points lie to the left of the supply curve because of the assumption that the individual is able to obtain his equilibrium choice.

What is the role of demand under these conditions? It may be postulated that demand and supply in the market for a given type of labor determine the wage rate and total quantities of hours of work. The wage rate is thus given to an individual worker and he chooses between market activity and nonmarket activity based on this predetermined wage rate, ceteris paribus.

According to the theoretical considerations developed to this point, an individual would take as given the wage rate and would determine his equilibrium choice of hours of work, under ceteris paribus conditions. This development assumes that the demand for hours per week facing individuals is infinitely elastic at the given wage rate. This assumption is not completely unrealistic for low-income workers. Doeringer has hypothesized that the ghetto labor

market exhibits excess labor demand and he offers two pieces of evidence to support his view:

> ...(1) the presence of large numbers of unfilled low-skilled job vacancies frequently reported in or near central city areas, and (2) statements by ghetto workers that menial, less preferred employment is readily available, even to the casual job seeker.[30]

The idea of an infinitely elastic demand facing an individual is not inconsistent with the idea that workers are offered a fixed quantity wage-hour package associated with particular jobs. Each worker is faced with more than a single wage-hour package, and he should be able to select a combination that is consistent with his preferences. As Fleisher indicates,

> ...it is not at all obvious that because we can think of occupations where there is little opportunity to adjust employees' weekly hours of work that the workers found in such occupations have therefore been coerced into working the number of hours required...Thus it would seem that employers would find it easier to hire workers who prefer the required length of the work week than workers who object to it.[31]

Consistent with the idea of the infinitely elastic demand curve is the proposition that employers should be thought of as expressing their demands for labor in terms of total labor hours, not in terms of hours per week for each worker.

As long as the wage rate is free to vary according to the forces of market demand and supply, workers will adjust their individual choices accordingly. Actually, wage rates tend to be "sticky" in a downward direction. To the extent that wages are inflexible,

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[30]Peter Doeringer, "Manpower Programs for Ghetto Labor Markets," Programs to Employ the Disadvantaged, ed. Peter Doeringer (Englewood Cliffs, N. J., 1969), p. 254.

[31]Fleisher, pp. 60.

reductions in market demand will result in restrictions on the opportunities for working the desired number of hours.

To the extent that imperfections in the market result in disequilibrium wage rates being given to the individual, changes in market demand will result in changes in employment opportunities. This means that individuals are unable to attain their equilibrium choices of hours of work where restrictions on opportunities exist.

A limited inquiry into the opportunity to work question has been undertaken by James Morgan. He reports that, "..... when we asked people whether they would like to work more hours a week more than a third said yes, and among the uneducated and unskilled, more than half said that they would like more work."[32] This result is suggestive of individuals being off their supply curve at points to the left of the curve.

It is hypothesized that employment opportunities and the level of economic activity are directly related. The unemployment rate is typically used as a proxy for the level of economic activity; therefore, a negative relation is expected between hours of work and unemployment rates.

In cross-sectional analysis on individual observation, the unemployment rate is a meaningful concept only as applied to some group or geographic area. An area market variable such as unemployment has meaning concerning individuals when interpreted as a measure of

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[32]James N. Morgan, "The Supply of Effort, The Measurement of Well-Being, and the Dynamics of Improvement," American Economic Review, LVIII (May, 1968), p. 31.

the probability that a person will be able to find work in the area during a given period of time.[33] This probability statement refers not only to those individuals currently unemployed, but also to workers currently employed who might possibly change jobs or become multiple job holders.

In addition to the metropolitan area unemployment rate, Bowen and Finegan also used an industry-mix variable and a measure of the average wage variable.[34] The industry-mix variable reflects job opportunities for men while the market wage variable indicates what the expected pay-off would be for accepting employment in the area. Both variables are considered to be positively associated with the quantity of labor supplied.

In their study of labor force participation, Cohen, Lerman and Rea use SMSA unemployment rates and percentage employment change in SMSA's as proxies for employment condition.[35] The unemployment rate is assumed to reflect labor market adjustments over the long run. The inclusion of an employment change variable is justified on the grounds that the time path as well as the level of unemployment rates are relevant.

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[33] See Bowen and Finegan, p. 76.

[34] Bowen and Finegan, p. 75.

[35] Malcolm S. Cohen, Robert I. Lerman and Samuel A. Rea, Jr., "The Effects of Family Income and Area Employment Conditions on Labor Force Participation: A Micro Study." (A paper presented at the Winter Meetings of the Econometric Society, New York, December 30, 1969), p. 16.

> A constant unemployment rate over time produces a lower percentage of layoffs and a higher percentage of quits and new entrants than the same unemployment rate reached through a fluctuating time path of unemployment rates. The percentage change in SMSA employment does not reveal the precise path by which a given SMSA unemployment rate was reached. However, given the unemployment rate in the SMSA, a high percentage increase by SMSA employment probably benefits new entrants more than those susceptible to employment through layoffs.[36]

It should be noted that these proxies for demand conditions are aggregate measures of economic activity for different geographic areas. It is assumed that individuals are aware of the opportunities that exist under different demand conditions.

Limitations of Model

Cross-Sectional Analysis

A major question of concern when using cross-section data involves the validity of using results based on this type of data to predict changes which occur over time. Cain states: " . . . the issue is one of how to use static relations from cross-sections to assess dynamic adjustments . . ."[37]

The cross-section technique used in this study yields estimates which combine labor force adjustments to both long-run differences in economic opportunity and social factors as well as short-run cyclical

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[36] Ibid., p. 17.

[37] Glen Cain, "Unemployment and Labor Force Participation of Secondary Workers," Industrial and Labor Relations, XX (January, 1967), p. 278.

factors.[38] The problem is stated succintly by Lester Taylor:

> Time series variation is dominated by dynamic, intertemporal factors that are absent from cross section data. As a consequence, it is argued that time series estimates will largely reflect short-run adjustment to changes in income and prices, while cross section estimates will tend to reflect long-run adjustment. Of course it is possible that not all households will be affected equally by cyclical and other time-varying factors, in which case cross section estimates will also reflect some short-run phenomena. The best available empirical evidence, however, indicates that the impact of time-varying factors on cross section variation is small relative to the impact of factors peculiar to individual households. Factors such as family size, age of head of household, race, education of head, etc., all vary from household to household, but very little from year to year. As a result, they will be reflected only to a small extent in time series variation.
>
> With particular reference to income elasticities, these facts go a long way toward explaining why cross section estimates are usually substantially higher than time series estimates, since in terms of flows, long-run coefficients are always at least as large as short-run coefficients.[39]

It is instructive to note the implications of Becker's theory for cross-section elasticity estimation. Prices of various commodities facing different families in a cross-sectional analysis are assumed to be the same. Commodity prices, however, would differ systematically if incomes differ because of differences in earnings. Foregone earnings, thus prices, would be higher for the higher income families.[40]

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[38] Joseph D. Mooney, "Urban Poverty and Labor Force Participation: Reply," American Economic Review, LIX (March, 1969), p. 194.

[39] L. D. Taylor, "Combining Budget and Time Series Information in Projecting Personal Consumption Expenditures," Memo, 1967, pp. 12-14, cited by Julian L. Simon and Dennis J. Aigner, "The Length-of-Run Nature of Cross-Sectional and Time Series Parameter Estimates," Social Systems Research Institute Workshop Series, SFM 6802 (University of Wisconsin, 1968), pp. 3-4.

[40] Becker, p. 508.

Becker states:

> The effect of income would be underestimated for earnings-intensive and overestimated for other commodities, because the higher relative prices of the former would cause a substitution away from them and toward the latter. Accordingly, the income elasticities of demand for "leisure," unproductive, and time-intensive commodities would be under-stated, and for "work," productive, and other goods-intensive commodities over-stated by cross-sectional estimates.[41]

Observed price elasticities should also be interpreted according to the importance of foregone earnings and the substitution between time and goods. Specifically,

> A given percentage increase in the price of goods would be less of an increase in commodity prices the more important foregone earnings are. Consequently, even if all commodities had the same true price elasticity, those having relatively important foregone earnings would show lower apparent elasticities in the typical analysis that relates quantities and prices of goods alone.[42]

Thus it would not be representative to use the estimates of labor force sensitivity based on cross-section analysis to project short-run cyclical changes in labor force behavior.[43]

Other Limitations

It is expected that the multiple correlation coefficient associated with the model utilized in this study will be low. Cain states that "the low multiple correlations common to regressions with survey data

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[41] Ibid.

[42] Ibid., p. 515.

[43] Edwin Kuh, "The Validity of Cross-Sectionally Estimated Behavior Equations in Time Series Applications," Econometrica, XXVII (April, 1959), pp. 197-213.

may not be cause for alarm, but they do tell us that there are missing variables that could greatly add to the explanatory power of the relation."[44] It is assumed that the excluded variables are uncorrelated with the variables included in the equation, but we cannot be sure.

A general problem which is associated with all single equation models is that many variables that are treated as exogeneous should be treated as endogenous. In avoiding the use of simultaneous equations, a specific consequence is the necessary use of the concept of income from nonemployment sources to capture the "income effect."

It is also assumed that the productivities of husbands in nonmarket activity are either unvarying or uncorrelated to the included explanatory variables. Unless the number of children can be accepted as a proxy for the home productivity of the wife, a similar assumption is necessary for her as well.

In spite of the limitations indicated, it is felt that valuable information can be obtained with the use of this model. Specific limiations and insights will be indicated as the analysis proceeds. Data editing procedures, specification of selected regression equations, and a discussion of desired and available variables are explored in the following chapter.

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[41] Ibid.

CHAPTER III

DATA AND METHODS

Included in this chapter are modifications of the general model presented in Chapter II, applied to selected groups of individuals, and using terms available in the data. The chapter format is to discuss first the original data source and the editing procedures used in filtering this data into the desired data-bank. Next, selected groups are filtered from the data-bank and regression equations are specified for these groups. This is followed by a detailed discussion of the various measures available in the data-bank, resulting in a selection of the measures to be incorporated into the analysis.

Description of Data

The 1967 Survey of Economic Opportunity (SEO) serves as the basic data source for this study.[1] The Bureau of the Census conducted this survey for the Office of Economic Opportunity during the Spring of 1967 to obtain more detailed information about poverty than normally available from Current Population Survey (CPS) questions. The SEO sample of approximately 30,000 households is composed of two parts: (1) A

[1] Subsequent to the distribution of the SEO data in September, 1969, a number of inconsistencies in the data were discovered both by the data users and by the ASSIST Corporation. The ASSIST Corporation handled a large portion of the original SEO data editing for the Office of Economic Opportunity. Transaction tapes provided by the ASSIST Corporation were obtained and the data corrected.

national self-weighing sample of approximately 18,000 households, selected in the same manner as the CPS sample; and (2) A supplementary sample of 12,000 households drawn from areas with a large concentration of nonwhites.

The reason for the second part of the SEO sample was to increase the reliability of estimates for the poverty population.

> The supplementation has the effect of increasing the reliability of estimates of the characteristics of about 17 million persons, over 2/3 of whom are nonwhite. However, it does not materially improve the national estimates for whites beyond what would have been obtained from the E-1, [part (1)], sample only.[2]

Data Editing

This study utilizes specified groups from an edited version of the SEO data. This edited version of the SEO data will hereafter be referred to as the data-bank. The editing procedure involved a sequential filtering process in which an interview unit record[3] was eliminated if one (or more) of the following factors was identified in that record:

1. SEO addresses where interviews were not taken.
2. Households containing interview units on farms or self-employed, because of the difficulties associated with imputing values for wage rates.
3. Interview units with gross earned and unearned incomes above the low-cost poverty level as defined by the Social Security Administration (SSA).

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[2] "1966 and 1967 Survey of Economic Opportunity Sample Design and Weighting," Office of Economic Opportunity, p. 7.

[3] An interview unit may be either a family or an individual.

4. Interview units with heads in the military, since neither an accurate hours nor a money wage measure can be imputed.

The data-bank is thus composed of civilian, nonfarm, low-income interview units whose head was a wage earner.

These reasons, in the order incorporated into the iterative editing procedure, with the number of cases filtered out at each step, are summarized in Table 1.

TABLE I

EDITING PROCEDURE USED TO OBTAIN DATA-BANK

Reason for Deletion	Number of Cases Deleted
Not interviewed*	11,570
Farm*	1,662
Interview unit above SSA Low-Cost Income Threshold	18,018
Interview-unit head in military	62
Self-employed head of interview unit	436
Resulting sample size (Interview units)	7,130

*Refers to households, which may contain more than one interview unit; thus, aggregation problems exist if one attempts to sum the number of cases deleted.

It should be noted that the poverty status previously mentioned is the SSA low-cost level rather than the more familiar poverty (economy)

level. The matrix of low-cost threshold income levels for nonfarm families headed either by a male or female with different family composition and size are shown in Table II for those readers who are unfamiliar with this concept. The low-cost threshold income figure included in the SEO data differs from that shown in the table for a given set of family characteristics. The OEO modified the values in the table to correct for an error in the price index used. The new values are 97.7 per cent of the values presented in Table II. The more restrictive SSA poverty index will be introduced in defining specific groups for analytic purposes.

Groupings Designated for Initial Estimating Procedures

The primary focus of this study is on those family units who satisfy the eligibility criteria of the proposed Family Assistance Plan (FAP); however, other selected low-income groups are identified for comparative purposes. The purpose of this section is to discuss the editing procedure used in the section of specific groups from the data bank and to discuss the respective regression equations to be estimated for given groups. The statistical procedure used in the analysis of the data is also explored.

The Primary Family Assistant Plan Group

FAP is basically designed to assist low-income families with children under 18 years of age or 18 to 21 years of age and in school, including families with male heads and families where the head is

TABLE II

NONFARM LOW-COST THRESHOLD INCOME LEVELS DEVELOPED BY THE SOCIAL SECURITY ADMINISTRATION, 1966*

Family Size	Number of related children under age 18 and/or 18-21 years of age and in school						
	0	1	2	3	4	5	6
Male Head							
1 Under Age 65**	2138						
65 or Over	1926						
2 Under Age 65**	2969	3158					
65 or Over	2676	3158					
3	3384	3469	3554				
4	4417	4467	4315	4400			
5	5296	5348	5161	5026	5059		
6	6025	6092	5923	5804	5635	5618	
7 or More	7581	7648	7479	7344	7174	6887	6802
Female Head							
1 Under Age 65**	1973						
65 or Over	1880						
2 Under Age 65**	2740	2865					
65 or Over	2611	2865					
3	3282	3367	3351				
4	4264	4332	4298	4197			
5	5095	5178	5128	5043	4856		
6	5889	5940	5889	5787	5618	5432	
7 or More	7412	7462	7412	7310	7123	6955	6617

SOURCE: 1967 Survey of Economic Opportunity Codebook published by the Office of Economic Opportunity.

NOTES: * -- 1964 Nonfarm Criteria raised by 8.5 per cent to allow for increase in per-capita cost of low-cost food plan between January 1964 and December 1966.

** -- Refers to age of family head.

working.[4]

FAP editing procedure. The data-bank contains records for interview units below both the SSA poverty and low-cost levels. Interview units whose income levels fall below the low-cost threshold, but not below the poverty (economy) level are designated "near-poor." Only interview units whose income levels are below the poverty-income threshold are desired for the FAP sample. The poverty threshold income levels are shown in Table III.

Also deleted are interview units without children. The FAP sample consists only of families who have children below 18 years of age or 18 to 21 years of age and in school. Since the 18-to-21-year-olds attending school were not coded as children in the SEO data, a filtering procedure was used to identify families with children, including these 18-to-21-year-olds, who were considered as near-poor using the SSA indices. The revised definition of children resulted in transferring 12 family records from the near-poor to the poor classification.

Since both employed and unemployed individuals are found in the data, the sample was further restricted to only families who had a working family head. This is not a FAP requirement, but rather a restriction based on the hours measure selected for analysis. The family head was considered a "working" family head if he reported hours worked during the week prior to the survey and reported weeks worked during 1966. In families where both the husband and wife were present,

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[4]Glen C. Cain and Leonard J. Hausman, "The Family Assistance Plan: An Analysis and Evaluation," A policy statement of the National Manpower Policy Task Force Associates (Washington, D. C., April 17, 1970), pp. 2-3.

TABLE III

NONFARM POVERTY (ECONOMY) THRESHOLD INCOME LEVELS DEVELOPED BY THE SOCIAL SECURITY ADMINISTRATION, 1966*

Family Size	Number of related children under age 18 and/or 18-21 years of age and in school						
	0	1	2	3	4	5	6
Male Head							
1 Under Age 65**	1758						
65 or Over	1579						
2 Under Age 65**	2198	2462					
65 or Over	1973	2462					
3	2559	2642	2792				
4	3374	3424	3306	3473			
5	4071	4121	3988	3888	3971		
6	4670	4686	4587	4487	4354	4421	
7 or More	5882	5932	5816	5716	5584	5384	5335
Female Head							
1 Under Age 65**	1626						
65 or Over	1559						
2 Under Age 65**	2031	2217					
65 or Over	1949	2217					
3	2476	2359	2609				
4	3240	3356	3341	3306			
5	3888	4005	3988	3955	3822		
6	4537	4620	4587	4553	4404	4270	
7 or More	5699	5783	5766	5716	5567	5451	5184

Source: 1967 Survey of Economic Opportunity Codebook published by the Office of Economic Opportunity.

Notes: * -- 1964 nonfarm criteria raised by 6.5 per cent to allow for increase in per capita cost of economy food plan between January 1964 and December 1966.

** -- Refers to age of family head.

the husband is always designated family head.

These editing procedures are illustrated in Table IV by showing the number of families omitted for each of the above reasons. The reasons for deletion are listed in the order performed since a sequential filtering process was incorporated.

TABLE IV

EDITING PROCEDURE USED TO SELECT THE SAMPLE OF WORKING POOR WITH CHILDREN (FAP)

Reasons for deletion	Number of Interview Units Deleted	
Number of interview units in data-bank		7,130
Interview unit income was greater than poverty threshold.	1,893	
Interview unit had no children.	2,738	
Interview unit head was not working	1,288	
Total deletions		5,929
FAP sample size		1,211

It is important to recognize that this sample encompasses only the working or employed portion of the families qualified under FAP. A sample completely conforming to the FAP eligibility criteria would include the 2,499 records remaining after only the first two steps of

the editing process. The 1,211 families remaining after all three editing stages will be referred to as the FAP sample.

Specification of an initial FAP relation. The hours of work equation for the FAP group can now be specified using variables discussed in detail later in this chapter.

$$(1)\quad L = a + b_1W + b_2V + b_3D + b_4NA + b_5C + b_6O_w + b_7O_m + b_8O_h + b_9O_{rb} + b_{10}O_{sx} + b_{11}O_{ag_1} + b_{12}O_{ag_3} + b_{13}O_{ed_1} + b_{14}O_{ed_3} + e.$$

Equation (1) is read to show a relation between the number of hours supplied by family heads (L), and own wage rate (W), family income from nonearnings sources (V), indebtedness of the family (D), the level of assets net of liabilities possessed by the family (NA), the number of children in the family (C), and own classification with respect to each of the dummy variables: working wife (O_w), married (O_m), health limitation on amount of work performed (O_h), black (O_{rb}), female family head (O_{sx}), less than twenty-five years of age (O_{ag_1}), more than fifty-four years of age (O_{ag_3}), less than twelve years of education (O_{ed_1}), more than twelve years of education (O_{ed_3}), (a) is a constant and (e) is a random disturbance term with an assumed mean of zero and a constant but unknown variance.

The existence of intercorrelation among these variables will be explored. As stated by Melichar,

> A very useful aspect of the regression technique is that the analyst can explore the effects of intercorrelations among the factors by experimenting with equations containing different combinations of factors. By observing the amount and direction of change in the coefficients obtained for a given factor as other factors are in turn added to or deleted from the regression equation, one can ascertain which intercorrelations masked the underlying relationship between the dependent variable and the factor being studied.[5]

This technique will be followed for each of the regression equations; however, the variables and sequencing of deletion will be determined on an a priori basis.

Interactions between selected variables will be analyzed by introducing interaction terms directly into selected equations to be estimated.

The "Poor" Without Children

A second sample drawn from the data-bank consists of the working poor without children. These families differ from the FAP group only in the absence of children under 18, or 18 to 21 and in school. Unrelated individuals are included.

Cain and Hausman have shown the desirability of extending FAP coverage to include these poor families without children. They state:

> The inclusion of families without children and of unrelated individuals would, of course, enhance the goal of reducing poverty. The costs of such an extension of coverage is estimated to be about $1½ billion. A large portion of these benefits would supplement incomes of deserted, divorced, and single women, and much of the remainder would go to young couples, most of whom will eventually become

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[5] Emanuel Melichar, "Least-Squares Analysis of Economic Survey Data," Journal of the American Statistical Association (1965 Proceedings of the Business and Economic Statistics Section), p. 382.

> parents. One benefit from this expansion is that the "baby bonus" feature of the existing bill is removed. Childless couples would have no special incentive to alter their plans regarding child-bearing and it would be less likely that children would be transferred from their natural home to that of a childless relative to qualify the latter unit for FAP benefits. Both types of induced behavior are undesirable and would not arise if coverage were universal.[6]

Consideration of such an extension in coverage warrants a separate analysis of this group.

Editing procedure. Only interview units whose income levels fall below the poverty threshold, who have no children, and who were working family heads were selected for this sample. These editing criteria and the number of cases deleted at each stage are tabulated in Table V.

TABLE V

EDITING PROCEDURE USED TO SELECT THE SAMPLE OF WORKING POOR WITHOUT CHILDREN (WPWC)

Reasons for deletion of interview unit records	Number of interview units deleted	
Number of interview units in data-bank		7,130
Interview unit income was above poverty threshold	1,893	
Interview unit had children	2,499	
Interview unit head was not working	2,324	
Total deletions		6,716
Sample size		414

[6] Cain and Hausman, p. 3.

This sample will hereafter be referred to as the working poor without children (WP-WC) sample.

Specification of the WP-WC equations. Specific differences associated with the regression equations estimated for this sample include: (1) the exclusion of number of children (C) as an explanatory variable, and (2) the inclusion of a dummy variable O_F having a value of 1 if the interview unit is an unrelated individual, and 0 otherwise.

The Working Near-Poor

The official count of poor households is based on annual income, where families and unrelated individuals are considered poor if their income is less than the specified poverty index. The Social Security Administration's index of poverty, illustrated in Table III, is a minimum or threshold income per household of a given size, composition, and nonfarm status. The index is based on the estimated minimal cost of a nutritionally adequate diet for individuals. More specifically,

> In 1966 the Agriculture Department economy food plan, which is the core of the poverty index, provided for total food expenditures of only 75 cents a day per person (in an average four-person family). The index adds only twice this amount to cover all family items other than food... The measure of near poverty--about one third higher in cost--centers about the low-cost food plan.[7]

Although such an index is desirable in implementing policy, the specific threshold income levels are somewhat arbitrary. This point is emphasized by Tobin,

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[7]Mollie Orshansky, "The Shape of Poverty in 1966," Social Security Bulletin (March, 1968), p. 5.

> Neither of these aggregate measures, the count or the gap, awards any points for increasing the incomes of the near-poor, those households falling, say, between one and one and a half times the poverty line. The line is, after all, arbitrary and minimal, and it would be a hollow victory over poverty just to move all the poor a few inches beyond it. Some income supplementation proposals spill benefits on the near-poor. Quite apart from the fact that this spillover may be necessary for reasons of incentive, equity, and continuity, the near-poor should not be considered undeserving beneficiaries.[8]

This statement provides ample justification for the inclusion of a sample of the "near-poor" into this analysis.

Editing procedure. This sample consists of interview units whose income levels are greater than the poverty threshold income levels but less than the low-cost levels. Only interview units with reported work records were included in the sample. Listed in Table VI are the number of cases deleted for each reason. This sample will be referred to as the working near-poor (WNP).

Specification of the WNP equations. The WNP sample may be split into two components: interview-units (families) with children (WNP-C) and interview units without children (WNP-WC). This division allows the regression equations specified for FAP and WP-WC samples to be applied to the WNP-C and WNP-WC samples respectively. This separation should also facilitate comparative analysis. The sample size for WNP-C and WNP-WC is 701 and 201 respectively.

The samples defined in the preceding sections included: the working poor families with children (FAP, N = 1211), the working poor families and unrelated individuals without children (WP-WC, N = 414), the working near-poor families with children (WNP-C, N = 701), and

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[8] James Tobin, "Raising the Incomes of the Poor," Agenda for the Nation, 1969, p. 85.

the working near-poor families and unrelated individuals without children (WNP-WC, N = 201).

TABLE VI

EDITING PROCEDURE USED TO SELECT THE SAMPLE OF WORKING NEAR-POOR (WNP)

Reasons for deletion of interview unit records	Number of cases deleted
Number of interview units in data-bank	7,130
Interview unit income was below poverty threshold .	5,237
Interview unit head was not working	991
Total deletion	6,628
Sample size	902

Selected Variables

This section presents a detailed discussion of the available measures used in estimating the model specified in Chapter II. When more than one option is available for a given variable, the discussion clarifies why the chosen version was selected.

Hours Worked

It will be recalled from the discussion of hours of work in Chapter II that the information desired is a measure of the equilibrium number of hours individuals in low-income families would be willing to offer per unit of time at alternative price (wage) levels, ceteris paribus. Information is available in the data-bank on two dimensions of the hours worked component of the quantity of labor actually supplied to the market at various wage levels: hours worked per week (H), and weeks worked per year (K). The weekly hours of work measure is the number of hours worked during the week prior to the survey, while information on the number of weeks worked, either full-time or part-time, is based on the previous year (1966). This information, as well as other data secured by the SEO, was obtained from any member of the interview unit, 18 years of age or older, who knew enough about the activities of the other members to report for them.

The interview data on hours worked is intended to measure the number of hours actually spent at market activity by the individual during the week preceding the survey. Individuals' concepts of working time differ, however, and these differences may not be random in nature. T. A. Finegan states:

> Hourly rated workers (or those replying for them seem likely to report the number of hours for which payment was received, while salaried employees probably make a rough estimate of their work week based on the time spent in the office or away from home. Both groups are likely to overstate their "actual" hours--the former to the extent that hours paid but not worked are included, the latter to the

> extent that full deduction for leisure time in the office or away from home is not made.[9]

The consideration concerning salaried employees is probably not relevant to the low-income group.

The bias in reported hours worked by hourly rated workers may be somewhat offset by the tendency for individuals to report standard or regular hours rather than hours actually worked. Victor R. Fuchs has found, based on empirical analysis, that average hours for groups of individuals may not be affected since persons' actual hours will deviate both positively and negatively from reported hours.[10]

The use of weeks worked per year as an alternative measure of labor supplied by individuals was considered. This information was obtained by the SEO by asking individuals how many weeks during the past year they worked, either full-time or part-time, not counting work around the house. It is evident that identical responses may result from different actual amounts of time worked since part-time work in terms of hours is included. But, even if corrections could be made so that the weekly measure was a full-time equivalent, the measure may still not be the most appropriate selection. Fuchs has evidence based on the 1/1,000 sample of the 1960 U. S. Census that,

> if there were no correlation between hours and weeks worked across individuals, weeks worked would give a good indication of time spent at work. However...there is a clear tendency for persons working many weeks per year to work long hours per week also. Therefore, if we know that one

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[9] T. A. Finegan, "Hours of Work in the United States: A Cross-Sectional Analysis," Journal of Political Economy, 70 (October, 1962), p. 468.

[10] Victor R. Fuchs, The Service Economy (New York, 1968), p. 226.

> person worked more weeks than another, we would expect that he worked more man-hours per year by a greater relative amount than indicated by the relative number of weeks worked. Information on hours, therefore, adds to our knowledge of differences among groups in time spent at work...[11]

As discussed earlier, cross-section data are usually interpreted as measuring long-run tendencies. For this reason, annual hours worked by individuals may be a more appropriate measure of the quantity of labor supplied. Hours worked per year (L) by an individual are equal to the product of the number of hours worked during the week preceding the survey and the number of weeks worked during the previous year (1966), or L = HK. Hours of work are reported in continuous form, while weeks of work are grouped into class intervals. The relevant interval median was multiplied by the number of hours worked in the week prior to the survey to obtain annual hours worked.

Using hours worked for one week to estimate total hours worked for the previous year assumes, of course, that the reported hours worked in the week preceding the survey is the same as the average number of hours worked in each of the weeks worked in the previous year.[12] On the other hand, if (H) measures the <u>normal</u> hours worked per week, then (H) might be considered an average number of hours worked per week for the previous year. This would mean that (L) would more accurately reflect total annual hours of work.

The value for hours worked per year may vary for some groups of individuals, depending upon the time of year when the survey is

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[11] Fuchs, p. 226.

[12] The work now in progress by C. Russell Hill, University of Michigan, has provided insights into the shortcomings of the measures of hours worked.

conducted. Seasonal workers, for example, may work full-time part of the year and less than full-time, or not at all, during the off-season.

Variations in hours worked per year by individuals due to part-time work may result because the work is part-time in terms of hours worked per week, part-time in terms of weeks worked per year, or part-time due to both factors. Tests will be conducted for differences in the variation of hours worked due to the various types of part-time work. Dummy variables will be used to classify workers as to part-time or full-time status for both hours worked during the week preceding the survey and for the weeks worked during 1966.

Earnings rates

Several measures of earnings rates (W) are available in the SEO data. Each measure will be discussed in an attempt to show the one that is thought to be most appropriate for this analysis.

A wage earner's effective wage rate may be computed from the data on the week preceding the survey by dividing total weekly earnings before deductions (E_w) by the number of hours (H) worked during the week. It is assumed that the calculated wage rate is the normal wage rate that prevailed during 1966. To the extent that an individual is a multiple job holder, has changed jobs during or since 1966, or has worked overtime during the reference week, this measure for the individual's wage rate will be biased.

Information is not available from the data concerning the number of individuals who were multiple-job-holders during 1966. Of the family heads in the FAP sample, 71 per cent worked during the week

prior to the survey at jobs which were identical to the job longest held during 1966.[13] Such a large percentage indicates that the wage rate is probably not biased due only to job changes by individuals that may have occurred in 1966. Approximately 23 per cent (282) of family heads indicated that they worked more than 40 hours during the week prior to the survey. This result suggests a biased measure for the wage rate to the extent that those who worked more than 40 hours per week were paid overtime rates. One would expect, for low-income workers, that only a fraction received increased rates of pay; thus, the measure may not be seriously biased.

The second method for estimating an individual's wage rate is to divide gross annual earnings (E_y) by total hours worked during the year (L). This measure, as in the previous case, results in an average wage rate for the given time period; one that has the same limitations as the previously mentioned wage rate.

Koster calls attention to one shortcoming of using either of the above measures.

> Random or transitory variation in hours or weeks of work is likely to introduce spurious negative correlation since the wage rate is computed by dividing earnings by their product. Consequently, there will be a tendency toward negative bias for a coefficient estimated in a regression of H or [L] on [W].[14]

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[13] All tests and data counts in this chapter were based on the FAP sample unless otherwise indicated.

[14] Marvin Kosters, "Income and Substitution Parameters in a Family Labor Supply Model" (P-3339, The RAND Corporation, December, 1966), p. 60.

In his study of hours of work, T. A. Finegan found that the spurious correlation between mean hours worked by male wage-and-salary workers during the Census Week, 1950, and median hourly income for the year, 1949, is negligible among manufacturing industries.[15] He consequently suggested that such a spurious negative correlation may not be important in other non-manufacturing groups in cross-section analyses.

It is suggested that, of the two measures discussed, the wage rate based on weekly data for the week prior to the survey is most likely to minimize the chances of having spurious correlation with the dependent variable (annual hours worked). This is so because it is expected that individuals more accurately remember events and facts pertaining to more recent time periods and thus report the information more accurately.

A simple correlation coefficient was computed for the two alternative measures to test whether the selection of one or the other would be expected to make much difference in estimating the model. The coefficient had a value of .43, which suggests that some difference in the wage coefficient may result in estimating the model, depending on which measure is selected. Approximately the same correlation coefficient was obtained (.44) when the FAP sample was restricted to include only full-time workers. The low correlation between the two wage rates may have resulted from the measurement of the weeks component of total hours worked per year, where hours per year was the

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[15] T. A. Finegan, "Hours of Work in the United States: A Cross-sectional Analysis," Journal of Political Economy, LXX (October, 1962), pp. 469-470.

denominator in the wage rate based on yearly data. Weeks worked was not a continuous variable, rather it was restricted to selected intervals in the SEO data. The median value for each interval was used to estimate hours worked per year.

Two additional measures of individual earnings rates are available in the SEO data: earnings for the reference week in 1967 and for the year, 1966. Both are thought to be relatively less attractive for present purposes than those already considered. Since it has been shown that persons who work more weeks per year tend also to work more hours per week, "information on hours, therefore, adds to our knowledge of differences among groups in time spent at work, and hence improves our estimate of earnings per unit of time worked.[16] Thus the more direct measure of hourly earnings is preferable.

Kosters considered the use of the logarithm of total annual earnings as the dependent variable to avoid introducing errors in (H) or (K) into the dependent variable.[17] He shows that this measure is also undesirable since

> Variation across individuals with a given wage rate in hours of work per year and consequently in earnings introduces positive correlation which is especially important when individuals are used as observations in the regression. Hence, a positive relationship between hours of work and earnings is likely to appear even if the relationship between hours of work and the wage rate is negative.[18]

The earnings rate variable (W) used in this study will be the hourly wage rate calculated from hours and earnings data for the

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[16] Fuchs, p. 226-227.

[17] Kosters, p. 61.

[18] Ibid.

reference week. This rate, as well as the ones previously discussed, is a gross rate since no adjustments are made for taxes or other expenses of work.

The wage rate for the wife in families where both the husband and wife are working is not included directly in the regression equation. Instead, a dummy variable (O_w) is introduced to indicate whether or not the wife was working. The variable (Z), discussed later in this chapter, should provide an adequate control for the wife's wage rate. It was thought that perhaps the variability in the wife's wage rate would be sufficiently small so that its effect in the regression analysis would be basically that of a constant. Such was not the case. This variable had a mean of 1.08 dollars per hour (based on data from the reference week) and standard deviation of 57 cents in the FAP sample. It should be noted that of the 1,211 in the FAP sample, 722 were families composed of married heads, and of that number only 185 had working wives.

Income Other Than Earnings

Nonearnings income (V) is the summation of all wealth and transfer payment income. The various measures of (V) in the SEO data represent estimated total amounts received during the twelve months of 1966. Income from rents, dividends, and interest composes wealth income (V_w). Transfer payment income (V_T) includes the following:

1. social security or railroad retirement
2. government pensions
3. veterans, pensions or compensation
4. pensions from private employers

5. workmen's compensation, illness, or accident benefits
6. unemployment insurance benefits
7. public assistance, relief, or welfare from state or local governments. (aid to families with dependent children; aid to the blind or totally disabled; or old age assistance)
8. other types of regular income such as payments from annuities, royalties, private welfare or relief, contributions from persons not living in the household, and alimony or armed forces allotments. Lump-sum (once and for all) settlements or payments are excluded.

The distribution of nonearnings income among these components and the frequency of receipt for each component is illustrated in Table VII.

Almost half (507) of the families in the FAP group received some form of nonearnings income.[19] Only 18 per cent of nonearnings income (V) occurrences were in the form of wealth income (Vw), while 82 per cent were in the form of transfer income (Vt). Wealth income was relatively more important for the near-poor groups where (Vw) accounted for approximately 30 per cent of the total number of occurrences of V. The mean value for (V) was 653 dollars.

Wealth income (Vw) was nil in the FAP sample, both in terms of relative number of occurrences and total dollars received; the percentages being 17 per cent and 1 per cent respectively. Such was not the case for the near-poor where the comparable figures were

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[19]The totals for V, Vt, and Vw do not represent families since a family may have had nonearnings income from more than one source.

TABLE VII

INCOME FROM SOURCES OTHER THAN EARNINGS
BY INCOME TYPE, 1966 - FAP GROUP

Item	Number of occurrences	Per cent of total occurrences	Per cent of total dollars received	Mean dollars received*	Standard deviation
Total nonearnings income (v)	507	100.00	100.00	653.12	976.45
Wealth income (Vw)	91	17.95	1.04	37.91	369.94
1-Rent	22	4.34	-0.02	-2.91	749.24
2-Interest	63	12.43	1.00	52.44	87.62
3-Dividends	6	1.18	0.06	35.00	21.34
Transfer income (Vt)	416	82.05	98.96	787.69	1059.55
1-Social Security	73	14.40	17.84	809.18	1049.70
2-Govt. Pension	5	0.99	1.83	1212.00	495.13
3-Veteran Pension	16	3.16	3.17	655.94	498.05
4-Private Pension	0	0.0	0.0	0.0	0.0
5-Workmen's Compensation	29	5.72	2.67	305.41	352.92
6-Unemployment Ins.	43	8.48	5.70	438.74	550.38
7-Public Asst. and Welfare	168	33.14	49.03	966.48	1265.72
8-Other Earnings	82	16.17	18.71	755.66	1030.16

* Means were calculated on the basis of the number of occurrences in each category of nonearnings income.

approximately 30 per cent and 8 per cent respectively. The mean value of 37 dollars for the FAP sample was about a fourth that of the near-poor groups. Interest made the most important positive contribution to wealth income for the poor groups, while rent was negative in its contribution.[20] Although interest income was important in terms of frequency of occurrence, having a mean value of over 50 dollars for the near-poor, rent was a more important component in terms of percentage of total (V) dollars received.

The mean value for (Vt) of 787.69 was about 100 dollars less than for the near-poor group. Public assistance and welfare, social security, and "other income" were the nonearnings incomes most frequently received by the FAP group, totaling over 60 per cent of all (V). These categories accounted for over 85 per cent of all nonearnings income. "Public assistance and welfare" was the most significant of the three categories both in frequency of occurrence, 33 per cent, and in percentage of total (V) received, 49 percent, having a mean value of 1,265 dollars. Except for the working near-poor without children, public assistance and welfare had about the same compositional nature among the selected groups; however, the mean is significantly smaller (less than 350 dollars) for the poor without children. Social security

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[20] Interest is defined as money received by a person for the use of money. Interest accruing but not actually received is also considered as "interest." Rent is a net concept, calculated by subtracting from gross rent all the cost incurred by the owner in connection with the property. Cost includes such items as depreciation, taxes, repairs, maintenance, insurance and interest on mortgages. The cost of any permanent improvements are excluded.

Also considered as rent is the net income from roomers and boarders, where expenses include such items as cost of food and general upkeep of facilities.

is approximately equal in relative importance between the poor and near-poor samples with children, having a slightly smaller mean value for the near-poor group. This type of income is much more important for the poor and near-poor families without children with the frequency of occurrence being approximately 45 per cent and accounting for approximately 70 per cent of all (V) received with a mean value in the 400 dollar range for both groups.

The "other income" category is relatively less important for groups other than FAP both in terms of frequency of income occurrence by type and percentage of total (V).

The measures of dispersion shown for each of the components of (V_t) and (V_w) indicate the large variability within each class of income. Furthermore, these dispersion measures suggest that various categories of nonearnings income have skewed distributions since the components of (V_t) and (V_w) are restricted to positive values with the exception of rent.

Shortcomings of the nonearnings income variable. Several problems are associated with adopting (V) as the income variable. Measurement error in the nonearnings income variable may result as a consequence of underreporting or misreporting. Martin David found that "there is an underreporting of income from assistance in the population studied which runs to one-fifth of the total benefits paid out by the welfare

agency.[21]" This type of measurement error would bias the income coefficient toward zero.

Another problem involves the appropriateness of nonearnings income as an income variable.[22] Nonearnings income can accrue to a family in the form of wealth income or transfer income. Since wealth income may be received in a nonsystematic manner, its effect on work effort would be much the same as would be expected for the receipt of any transitory income. This problem may not be cause for concern in this study because of the limited amounts and number of occurrences associated with (V_w) and its components.

Wealth income (V_w) may, however, result from a return on gross assets. In such a case, (V_w) would be positively correlated with the level of assets. Such a correlation would introduce collinearity problems since either gross or net assets are included as an exploratory variable in selected regressions. Simple correlation analysis between (V_w) and both (NA) and (A) failed to provide strong support for the hypothesized relationship, especially for the FAP sample. The correlation coefficient for the association between (V_w) and (A) was 0.26, while that between (V_w) and (NA) was 0.45.

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[21]Martin David, "The Validity of Income Reported by a Sample of Families Who Received Welfare Assistance During 1959," American Statistical Association Journal, LVII (September, 1962), p. 685. Also see Michael E. Borus, "Response Error and Questioning Technique in Surveys of Earnings Information," American Statistical Association Journal, LXI (September, 1966), pp 729-738. The latter study deals with income from earnings rather than nonearnings income; thus, the finding that the small average response error incorporated rather large offsetting positive and negative errors is applicable to the wage rate measure used in the study since earnings income is found in the numerator of that measure.

[22]Kosters, pp. 17-18.

The receipt of some transfer income, on the other hand, is contingent on institutional eligibility criteria. Money payments provided through such programs as unemployment insurance, workmen's compensation, and, to a lesser degree, social security depend upon evidence of not working. If nonearnings income is largely composed of these types of transfers, then (V) may be negatively correlated with (H) due to the institutional constraints rather than due to any "pure income effect." This problem is perhaps least significant for the FAP group since the work constraining transfers mentioned above are least prominent for the FAP group.

It is argued that nonemployment income from income transfers is an acceptable measure of an income effect. Other things being equal, identical family units which might qualify for benefits under these programs would receive different levels of money payments according to their geographic location (state or local area). Thus, considerable variation in (V) would be expected independent of work constraints which would allow for an estimate of the income effect.

Stubblebine argues that a pure income effect must be associated with lump-sum receipts. Transfer payments cannot be considered as truly lump-sum since their distribution depends on past or current performance or some income criteria.[23] If the variation in transfer income was due to differing benefit levels between states, the problem

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[23]William Graig Stubblebine, "Alternative Direct Wage Subsidy Plans to Increase Recipient Income Levels and an Adequate Income Guarantee At Acceptable Cost: Comment" (paper prepared for the 1969 Western Economic Association Meetings, Long Beach, California, August 21-22, 1969), p. 2.

mentioned by Stubblebine may be partially overcome. Lack of information identifying the family's place of residence prevents a separation of the variation due to interstate differences from that due to other inter-personal differences.

Another income variable will be incorporated into the analysis in selected regressions as a basis of comparison in case of difficulties associated with (V_t). This alternative variable (Z) will equal total family income minus the earnings of the head.[24] To the extent that (Z) is primarily composed of various forms of (V), the same comments made concerning (V) or (V_t) would be applicable. (Z) should be a more reliably reported measure and should represent a significantly larger portion of family income for the families with multiple wage earners.[25]

Tastes

The taste variables are classified into three groups: (1) taste for money income; (2) taste for market work per se; and (3) taste for nonmarket work.

Taste for money income. The theoretical basis for these variables was provided in Chapter II. The extent of indebtedness and the level of net assets or net worth were the variables considered.

The total debt (D) for a family is enumerated in the SEO data and includes the following components:

1. debts on the home
2. debts on real estate

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[24] See Kosters, p. 8.

[25] Ibid.

3. debts on car and/or truck
4. debts to food and clothing stores, utility, fuel, and gas companies
5. debts to doctors, dentists, hospitals, or for other medical care
6. debts to banks or other financial institutions (aside from above debts)
7. debts to other persons, not including members of household

The value for (D) was given in the data as well as the values for its components.

Data on total assets (A), and its components, are also available from the SEO. The components of (A) include:

1. value of the home
2. value of real estate
3. money in checking or savings accounts or elsewhere
4. face value of owned govenment bonds
5. value of owned stocks
6. loans made to others
7. value of owned cars and/or trucks
8. value of other owned assets, such as oil royalties, patents, commodity contracts, boats and trailers. (Excluded are personal belongings and furniture.)

The value of assets, except where noted, is estimated current market value at the time the survey was conducted, not the actual purchase value.

The net asset position (NA) of a family is equal to total assets (A) minus total debts (D).

Taste for market work. Health, education, and marital status are available elements of this factor. Education (E_d) is measured by the highest grade of school completed. Educational attainment and such factors as health, productivity, and other variables may be positively related; therefore, spurious positive correlation may exist between (E_d) and (H).[26]

Dummy variables are introduced to control for marital status and health. Health restrictions affecting both the kind and amount of work performed by an individual are coded in the data. Limitations on amount of work would affect the number of hours individuals work, while restrictions on kind of work should affect wage rates. Of the 1,211 family heads in the FAP sample, 12 indicated that they were restricted in the amount of work they could perform, 45 reported restrictions in the kind of work, and 120 said they were restricted in the kind as well as the amount of work which could be performed. Since this study is concerned with hours of work, a dummy variable will be included in the analysis to control for the presence of restrictions on the amount of work performed.

Taste for nonmarket work. The number of children (C) in the family below age 18 will serve as a measure of the family head's taste for nonmarket work. A child of the family head must have been under 18 years of age and never married. Since the emphasis of this study relates to the labor supplied by family heads, only a portion of the general discussion presented in the last chapter concerning this variable is relevant. It is expected that the larger the number of

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[26]See Hill, p. 18.

children, the greater will be the incentive for family heads to substitute market for nonmarket activity.

Market Variables

Market variables are not directly available from the SEO data for such factors as unemployment rate or employment changes. In addition, individual records in the SEO data cannot be identified as living in a particular geographic area unless the subject lived in one of twelve large SMSA's at the time of interview. Thus, these market variables must be obtained from other sources and associated with only those families living in the twelve SMSA's.

The 1967 unemployment rates (U) shown in Table VIII were obtained for each of the twelve large SMSA's by color and central city SMSA designation.[27] These 1967 rates were chosen for several reasons: (1) 1966 rates from the Current Population Survey (CPS) are not available. (2) A comparison of unemployment rates for these twelve SMSA's for the years 1966 and 1967, using state employment security data for both the insured unemployed and total unemployment rates, failed to show cause for not using the 1967 rates. (3) Estimates based on CPS data are considered to be more reliable than establishment data for the individuals under consideration. (4) Although the dependent variable is interpreted to represent total hours worked in 1966, the derived measure is actually based on hours worked during the week prior to the survey, which was conducted in March, 1967.

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[27]The data source was the Manpower Report of the President (April, 1968), pp. 295-297.

TABLE VIII

CIVILIAN LABOR FORCE AND UNEMPLOYMENT RATE IN 12 LARGE STANDARD METROPOLITAN STATISTICAL AREA BY COLOR AND CENTRAL CITIES: ANNUAL AVERAGES, 1967

	Area and item	Civilian labor force[1]	Estimated Unemployment rate
	Baltimore		
SMSA:	Total	750	3.7
	White	330	2.2
	Nonwhite	200	7.6
Central City:	Total	400	5.5
	White	200	3.3
	Nonwhite	200	8.0
	Chicago		
SMSA:	Total	2,800	3.3
	White	2,350	2.4
	Nonwhite	450	8.3
Central City:	Total	1,500	4.3
	White	1,100	2.8
	Nonwhite	400	8.2
	Cleveland		
SMSA:	Total	750	3.8
	White	650	2.8
	Nonwhite	100	8.8
Central City:	Total	250	5.8
	White	150	3.4
	Nonwhite	100	10.1
	Detroit		
SMSA:	Total	1,600	4.5
	White	1,300	3.2
	Nonwhite	250	10.9
Central City:	Total	650	5.2
	White	450	2.9
	Nonwhite	200	9.8

TABLE VIII (Continued)

	Area and item	Civilian labor force	Estimated Unemployment rate
	Houston		
SMSA:	Total	650	3.3
	White	500	2.4
	Nonwhite	150	6.3
Central City:	Total	550	3.7
	White	400	2.7
	Nonwhite	150	6.3
	Los Angeles-Long Beach		
SMSA:	Total	3,350	5.6
	White	3,000	5.3
	Nonwhite	350	8.0
Central City:	Total	1,300	6.6
	White	1,050	6.0
	Nonwhite	250	9.1
	New York		
SMSA:	Total	4,650	3.7
	White	4,050	3.5
	Nonwhite	600	5.2
Central City:	Total	3,300	4.1
	White	2,750	3.9
	Nonwhite	550	5.3
	Philadelphia		
SMSA:	Total	1,900	3.7
	White	1,500	2.9
	Nonwhite	350	7.4
Central City:	Total	850	4.4
	White	600	3.2
	Nonwhite	250	7.5

TABLE VIII (Continued)

	Area and item	Civilian labor force	Estimated Unemployment rate
	St. Louis		
SMSA:	Total	900	4.4
	White	750	2.9
	Nonwhite	150	12.3
Central City:	Total	300	6.6
	White	150	3.5
	Nonwhite	100	11.3
	San Francisco-Oakland		
SMSA:	Total	1,350	5.4
	White	1,150	4.7
	Nonwhite	200	9.6
Central City:	Total	500	6.3
	White	350	4.9
	Nonwhite	150	9.6
	Washington, D. C.		
SMSA:	Total	1,050	2.3
	White	800	2.0
	Nonwhite	250	3.2
Central City:	Total	350	2.1
	White	100	(2) .4
	Nonwhite	250	2.8

Notes: [1]Rounded to the nearest 50,000

[2]Estimate not provided by BLS when unemployment is less than 5,000. Estimate calculated by extrapolation.

Source: Manpower Report of the President, Table D-11, "Civilian Labor Force and Unemployment in the 20 Largest Standard Metropolitan Statistical Areas by Color, and Selected Data for Age, Sex, and Central Cities: Annual Average, 1967," (April, 1968), pp. 295-297.

The employment change measure (M) is the percentage change in the level of employment in a given SMSA between 1965 and 1966 based on establishment data.[28] These rates are not given by SMSA central city designation.

One measure is available that may serve as an acceptable, albeit indirect, surrogate for demand conditions facing the individual. The respondent was asked the main reason he usually worked part-time work, (3) illness or disability, (4) did not want full-time work, (5) going to school or keeping house, and (6) other.

In cases where the reason given for part-time work was either (1) slack work or (2) found only part-time work, it is assumed that area demand conditions were the constraining factor and a dummy variable is introduced to represent these conditions. This rather tenuous assumption is discussed below; however, first it may be useful to note the instructions prepared for the interviewers concerning these two responses. The interviewers were instructed:

> Mark "slack work" for persons whose part-time work was because of work being slack at their plant or place of employment or if their hours were reduced because business was slow. This might include cases where a person's weekly schedule had been reduced below 35 hours a week permanently or for an indefinite period.
>
> Mark "could find only part-time work" if the person wanted full-time work but could find only part-time work. This would include cases where the person had to shift from a previous full-time t a different job which provided part-time work. Mark this category also for persons who

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[28] These rates were provided to the author by Malcolm Cohen, and were calculated from data published in Employment and Earnings, 13 (May, 1967), p. 100-109.

> recently came into the labor market and who could find only part-time work although they wanted full-time jobs.[29]

These instructions indicate that both types of responses are intended to reflect prevailing demand conditions in the local labor markets at the time of the interview.

There are limitations associated with this "reason-for-part-time-work" measure of demand conditions. First, responses are obtained only from part-time workers. This assumes that full-time workers are on their supply curves, which would not be the case if they desired to work additional hours at their given wage rates. Secondly, individual views concerning market factors are subjective and may or may not conform to actual market behavior.

Summary

The first portion of this chapter was concerned with a general description of the data with editing procedures used to draw various samples for analysis and specification of regression equations for each sample. The four groups selected for analysis were: (1) the working poor satisfying FAP eligibility criteria (FAP group), (2) the working poor who could not satisfy the FAP eligibility criteria because they had no children (WPWC group), (3) the working near-poor with children (WNP-C group), and (4) the working near-poor without children (WNP-WC group). The remainder of the chapter included a detailed discussion of the variables available from the SEO data. Each of the variables

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[29] 1967 Survey of Economic Opportunity Codebook, prepared by the Office of Economic Opportunity, p. 203.

selected for regression analysis and their respective symbols are presented in summary form in Table X.

The following chapter presents the results of the empirical analysis for each sample. Detailed findings for various groups within each sample are also presented.

TABLE IX

SUMMARY OF SELECTED VARIABLES

Variable	Description
H	number of hours worked during the week prior to the survey
K	number of weeks worked during the year 1966
L	total hours worked by the family head (L = HK)
E_w	total earnings of the family head for the reference week
W	hourly wage rates of the family head ($W = E_w \div H$)
V	family income from sources other than earnings $V = V_w + V_t$, where V_w is wealth income and V_t is transfer income
Z	total family income minus earnings of the head
D	total value of debts of the family
A	total value of family assets valued at market prices
NA	family's net asset or net worth (NA = A - D)
C	number of children in the family, where children are defined as related individuals below age 18 or 18-21 years of age and in school
U	area unemployment rate associated with family head's color and whether or not residence was a central city (measure available only for families living in one of twelve large SMSA's)
M	employment change variable associated with each of the large SMSA's for 1965 and 1966 measured in per cent
O_w	working wife
O_m	married
O_h	health limitation of family head with respect to amount of work which can be performed
O_{rb}	black family head
O_{sx}	female family head
O_{ag1}	less than 25 years of age
O_{ag2}	25-54 years of age
O_{ag3}	more than 54 years of age
O_{ed1}	less than 12 years of education
O_{ed2}	12 years of education
O_{ed3}	more than 12 years of education
O_{dq}	family heads who report that they found only part-time work because of either "slack" work or because "found only part-time work"
O_F	interview units composed of an individual

CHAPTER IV

EMPIRICAL FINDINGS

The empirical findings will be presented in this chapter for each of the samples previously discussed: Working poor with children (FAP), working near-poor with children (WNP-C), working poor without children (WP-WC), and working near-poor without children (WNP-WC). The results for each sample will be presented separately with the discussion format of the FAP sample providing the basic approach common to the other samples. A final section wil compare and summarize selected findings.

A detailed discussion of the various empirical findings is presented in this chapter. The reader who is uninterested in this detail can proceed to the concluding section of this chapter for some general considerations about the empirical findings, and then proceed to the final chapter for further discussion of the economic interpretation and policy implications of significant findings.

It should be emphasized that a basic concern of this research effort is to obtain reliable estimates for the income and wage variables, in order to calculate income and substitution effects. Therefore, the effects of interactions and intercorrelations between the income and wage variables and the other independent variables were intensively explored.

Unweighted regressions were judged appropriate for this study

based on findings in other studies.[1] Multivariate least squares was used to estimate relations among variables, with the caution that these estimates should be interpreted with full recognition of the limitations associated with these procedures of statistical inference.

In preliminary regressions based on the FAP and WNP-C samples, strong interactions were discovered between the part-time nature of the family head's work and both the income and wage variables. The part-time - full-time classifications were: full-time work weekly, full-time work hourly (FWFH); full-time work weekly, part-time work hourly (FWPH); part-time work weekly, full-time work hourly (PWFH); and part-time work weekly, part-time work hourly (PWPH). In order to facilitate comparisons it was decided to split all the samples into groups based on these classifications.

FAP Sample

The format of this section will be to present the regression results for each of the groups in the FAP sample, followed by a discussion of the estimated coefficients. Next, intercorrelations among the independent variables are analyzed. The effects of various interactions are also explored in this section as well as the estimation of income and substitution effects. This section concludes by examining the effects of various market variables.

Selected regression results are reported in Table X for each of the groups in the FAP sample. All regressions utilized hours worked per year (L) as the dependent variable. Definitions of the estimated

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[1] See Malcolm S. Cohen, Samuel A. Rea, Jr., and Robert I. Lerman, A Micro Model of Labor Supply, BLS Staff Paper No. 4, pp. 193-198.

TABLE X

REGRESSION RESULTS BASED ON TOTAL HOURS WORKED
PER YEAR AS THE DEPENDENT VARIABLE,
FAP SAMPLE

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	2468.7	2466.9	1550.3	1517.0	1661.3	1693.1	654.6	670.3
W	-60.09**	-60.42**	-120.97*	-132.83*	-4.98	-6.46	-7.38	-9.20
	(3.75)	(3.76)	(2.48)	(2.71)	(0.31)	(0.41)	(0.51)	(0.64)
Vt	-0.052	-------	0.267**	-------	0.188*	-------	0.172**	-------
	(0.77)		(3.45)		(2.99)		(3.69)	
Z	-------	-0.022	-------	-0.156*	-------	-0.148**	-------	-0.104**
		(0.71)		(2.92)		(3.59)		(2.78)
NA	-0.010	-0.010	0.003	0.001	-0.03	-0.04*	-0.01	-0.01
	(1.44)	(1.41)	(0.34)	(0.14)	(1.84)	(2.07)	(1.11)	(0.98)
D	-0.001	-0.001	0.027	0.031	0.02	0.02	0.01	0.02
	(0.20)	(0.14)	(0.12)	(1.30)	(0.88)	(0.95)	(0.93)	(1.69)
C	0.462	1.69	65.43*	69.46*	22.44	27.97	51.45*	47.25*
	(0.04)	(0.16)	(2.76)	(2.89)	(1.31)	(1.63)	(3.40)	(3.09)
Ow	-73.18	-63.05	-105.08	36.64	141.15	236.65	155.25	217.30
	(1.39)	(1.15)	(0.75)	(0.25)	(1.15)	(1.93)	(1.43)	(1.92)
Om	64.85	63.17	-99.17	-81.32	-447.16*	-497.30*	19.43	5.91
	(0.59)	(0.58)	(0.36)	(0.29)	(2.43)	(2.76)	(0.15)	(0.05)

TABLE X (Continued)

Independent Variable	FWFH Workers Vt-Income Variant	FWFH Workers Z-Income Variant	FWPH Workers Vt-Income Variant	FWPH Workers Z-Income Variant	FWFH Workers Vt-Income Variant	FWFH Workers Z-Income Variant	PWPH Workers Vt-Income Variant	PWPH Workers Z-Income Variant
Oh	-35.85	-47.39	362.08*	333.99*	39.57	49.55	-203.75*	-210.43*
	(0.36)	(0.48)	(2.54)	(2.32)	(0.37)	(0.47)	(2.48)	(2.52)
Orb	-163.59**	-161.23**	1.60	-15.96	108.19	122.09	64.02	67.57
	(3.47)	(3.44)	(0.02)	(0.16)	(1.05)	(1.20)	(0.92)	(0.95)
Osx	-32.02	-34.83	-279.97	-257.97	-589.09*	-625.60**	-10.49	-56.37
	(0.29)	(0.32)	(1.00)	(0.92)	(3.22)	(3.51)	(0.08)	(0.43)
Oag1	18.62	22.09	-37.29	-31.08	-26.31	-51.21	11.22	-12.21
	(0.24)	(0.29)	(0.30)	(0.25)	(0.18)	(0.35)	(0.13)	(0.13)
Oag3	4.89	6.85	-211.02	-143.69	-95.91	-68.76	62.64	40.12
	(0.06)	(0.07)	(1.08)	(0.73)	(0.90)	(0.65)	(0.61)	(0.39)
Oed1	8.20	7.89	107.76	157.64	4.26	17.64	-97.59	-63.76
	(0.15)	(0.14)	(0.96)	(1.40)	(0.04)	(0.17)	(0.99)	(0.64)
Oed3	84.86	82.18	234.26	253.67	191.65	290.19	-275.88	-254.63
	(0.70)	(0.67)	(0.84)	(0.90)	(0.74)	(1.14)	(1.33)	(1.20)
R2	0.264	0.264	0.440	0.425	0.462	0.482	0.446	0.461
N	452.0	452.0	222.0	222.0	167.0	167.0	193.0	193.0

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

variables are found in Table IX of the previous chapter, p. 82.

Estimated Coefficients

The coefficient of the wage rate variable (W) is significantly different from zero only for the FWFH and FWPH groups;[2] higher wage rates are associated with fewer hours of work. The (W) coefficient may be interpreted to show, using the first regression equation for example, that a one dollar difference (increase) in hourly wages among family heads is associated with a 60 hour difference (decrease) in total annual hours worked.[3] The negatively inclined supply curve indicated by this result implies that the negative income effect is larger in absolute value than the positive substitution effect.

The income variables, nonearnings income (Vt) and total family income less earnings of the head (Z), are shown in Table X to be significant for the FWPH, PWFH, and PWPH groups and each estimate has the predicted sign. Both the income variables (Vt) and (Z) are presented and discussed throughout the study for comparative purposes. The income coefficients show the change in hours of labor supplied associated with a dollar increment of the income measure. Both income measures were found not to be significantly different from zero for the FWFH group, implying that greater receipts of either (Vt) or (Z)

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[2]No interpretation is made of either the sign or the magnitude of coefficients if the estimate is not statistically significant at the 5 per cent level.

[3]The semantics of this sentence are important because the data are of a cross-section nature. If these results are interpreted as a one dollar increase in the wage rate leading to a 60 hour reduction in yearly hours supplied, an intertemporal quality has been inferred which may not be justified.

are not associated with differences in hours worked.

The estimated coefficient for (C) was significant in the equations for the FWPH and PWPH groups. As expected, heads of families with larger numbers of children supplied more hours of work per year. The effect of this variable was stronger for the FWPH family head's labor supply.

Married family heads (Om), in the PWFH group, supplied substantially fewer hours than did unmarried heads. If the spouse is present, the married family head is male; however, the married family head may be either male or female if the spouse is absent from the household. The negative sign for (Om) was not expected and the value estimated for the coefficient is surprisingly large.

Perhaps the unexpected results for (Om) can be explained by noting several facts concerning the PWFH group. This group for the FAP sample was composed almost entirely of black families; 162 of the 167 in the group were black. Also, approximately 60 per cent of the families in this group were headed by females. The simple correlation between (Om) and (Osx) was found to be -.916 which implies that most family heads were either married males or unmarried females.

This intercorrelation was further explored by dropping (Osx) from the equation and estimating the coefficient for (Om). In unreported regressions omitting (Osx), the coefficient for (Om) changed signs and was estimated to be 58.45 ($t = 0.69$) and 49.33 ($t = 0.58$) for equations containing the (Vt) and (Z) income variables respectively. Such intercorrelations masks the net relation of each variable when both are included in the same regression. The insignificant "t" values obtained from the unreported regressions are consistant with the findings in the other groups.

Family heads with health constraints on the amount of work they can perform (O_h) worked substantially more hours in the FWPH group, but substantially fewer hours in the PWPH group, than did heads without such constraints. The positive values 362.08 and 333.99 for (O_h) for the Vt and Z income variant respectively should not be misinterpreted. The positive sign should not be alarming since the coefficient for (O_h) indicates the differences in hours worked by health constrained family heads as compared with other family heads for each group of part-time workers. Persons with health related constraints on hours of work would be expected to be classified in one of the groups other than the FWFH group; thus, comparisons are not being made between the health constrained family head and all other workers.

In unreported regressions on the FAP sample where family heads were not separated into the various groups, (O_h) had an estimated coefficient of -174.28 (t = 2.32**) and -202.48 (t = 2.68**) for equations with (Vt) and (Z) as income measures respectively. These results do conform with expectations.

Black heads of households (O_{rb}) supplied significantly fewer hours per year (approximately 160 total hours less) in the FWFH group than their white counterparts. This coefficient for (O_{rb}) is the number of hours supplied by blacks net of the effects of the other included independent variables. The effects of race on the wage and income variables are presented in the discussion of interactions.

The coefficient estimated for (Osx) was significant only for the PWFH group; however, it has been indicated that (Osx) and (Om) are intercorrelated. In unreported regressions where (Om) was deleted, the estimate for (Osx) was -196.28 (t = 2.37**) and -200.59 (t = 2.40**)

for equations with (Vt) and (Z) as income variables respectively. It is of interest to note that although the magnitudes of the coefficients were substantially reduced, the signs remained unchanged and the "t" values were still highly significant. The coefficient was of the expected sign, supporting the hypothesis that females have greater taste for unpaid work in the home.

Although estimated coefficients which were insignificant are not discussed, it should be mentioned that education and age variables of a continuous form were also estimated in preliminary regressions. The coefficients for these continuous variables were found to be nonsignificant in regressions for all four groups.

Intercorrelation

When some of the independent variables are intercorrelated with one another the coefficients estimated for each variable will differ in magnitude, and perhaps also in sign, as variables correlated with it are added to or deleted from the regression equation. Such instability was illustrated between (Osx) and (Om) in the PWFH group. A major effort in this study is directed at determining possible intercorrelations of the various independent variables with (Vt), (Z), and (W). Stability for these latter variables is important since they are utilized to estimate income and substitution effects.

One procedure used to explore the effects of intercorrelations is described by Melichar:

> By observing the amount and direction of change in the coefficients obtained for a given factor as other factors are in turn added to or deleted from the regression equation, one can ascertain which intercorrelations masked

the underlying relationship between the dependent variable and the factor being studied.[4]

Quite stable estimates were obtained in all four groups for the coefficients of (W), (Vt), and (Z) in that intercorrelations between each of these variables and other included independent variables were of little consequence. This desirable feature was also found in unreported regressions applied to a composite of the FWPH and PWFH groups, a composite of all part-time groups, as well as a composite of all groups.

Mention should be made of the few weak intercorrelations involving either W, Vt or Z that were discovered. (W) was found to be slightly correlated with (O_h), (Ow), (C), and (Vt) in both the PWFH and PWPH groups. (Vt) and (W) would be expected to be negatively correlated, as was found, if the receipt of (Vt) imposed constraints on the amount of work which may be performed to remain eligible for the income receipt. The part-time work allowed under such constraints would tend to be associated with lower paying jobs. Another possible explanation would be that if families having large numbers of children receive larger (Vt) payments and if large proportions of family heads are female (PWFH = 60%; PWPH = 47%), child care may preclude them from full-time jobs with associated higher wage rates. This explanation suggests why (C) and (Vt) might both be expected to be at least weakly correlated with (W).

It would not be surprising that (O_h) should be negatively related

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[4]Emanuel Melichar, "Least-Squares Analysis of Economic Survey Data," American Statistical Association Journal, 1965 Proceedings of the Business and Economic Statistics Section, p. 381.

to (W) if part-time work, as mentioned above, tends to pay a lower wage rate and if individuals with health restrictions are concentrated in jobs of a part-time nature. This hypothesis warrants further investigation.

(Ow) was found to be slightly intercorrelated with (W). It will be recalled that (Ow) was introduced to control for the wage of the working wife, albeit a rough and perhaps inadequate measure. (Ow) was also slightly intercorrelated with (Z) for both the PWFH and PWPH groups. This correlation should be expected since (Z) includes the wife's earnings. Actually, (Ow) should not be included when (Z) is the income measure. A more accurate estimate for the (Z) coefficient is found in Table XI.

Minor intercorrelation also existed between (Vt) and Osx). Female family heads were more likely to receive income from nonemployment sources (Vt) than male heads of households. This should be expected under current welfare programs (AFDC).

Many of the coefficients of the variables intercorrelated with (W), (Vt), and (Z) were not statistically significant from zero. The regressions presented in Table X were reestimated with only the significant variables other than (W), (Vt), and (Z) included and the results are reported in Table XI. Intercorrelations among other independent variables are not presented since, where they did exist, they did not influence the coefficients of (W), (Vt), or (Z).

Income and Substitution Terms

Income and substitution effects of wage differences as well as income, wage, and substitution elasticities are presented in Table XII.

TABLE XI

REGRESSION RESULTS FOR EQUATIONS INCLUDING ONLY SIGNIFICANT VARIABLES;
DEPENDENT VARIABLE: TOTAL HOURS WORKED PER YEAR,
FAP SAMPLE

	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
Independent Variable	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	2505	2509	1375	1407	1820	1923	629	664
W	-57.33** (3.65)	-57.33* (3.66)	-84.64 (1.957)	-101.20* (2.31)	0.96 (0.06)	2.81 (0.18)	-4.84 (0.36)	-5.99 (0.42)
Vt	-0.0698 (1.15)	-------	-0.2860** (3.83)	-------	-0.1904** (3.15)	-------	-0.1774** (4.12)	-------
Z	-------	-0.0326 (1.20)	-------	-0.1562* (3.09)	-------	-0.1132* (2.93)	-------	-0.0898* (2.60)
C	-------	-------	76.94** (3.74)	83.66** (3.97)	-------	-------	52.42** (4.02)	51.17** (3.79)
NA	-------	-------	-------	-------	-------	-0.0324 (1.83)	-------	-------
Om	-------	-------	-------	-------	-410.24* (2.32)	-462.38 (2.65)	-------	-------
Osx	-------	-------	-------	-------	-592.08* (3.33)	-675.24** (3.86)	-------	-------
O_H	-------	-------	357.37* (2.59)	334.06* (2.39)	-------	-------	-196.25* (2.47)	-211.57* (2.59)

TABLE XI (Continued)

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
O_{RB}	-172.03** (3.93)	-165.33** (3.77)	-------	-------	-------	-------	-------	-------
R^2	0.234	0.234	0.396	0.371	0.399	0.415	0.408	0.351
N	452	452	222	222	167	167	193	193

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

These computations are based on the regression results reported in Table XI. Regression coefficients with insignficant values were assumed equal to zero for computational purposes.

The equations used in deriving the various estimates were:

1. income effect = $L \frac{\partial L}{\partial Y}$
2. substitution effect = $\frac{\partial L}{\partial Y} - L \frac{\partial L}{\partial Y}$
3. income elasticity = $\frac{Y}{L} \frac{\partial L}{\partial Y}$
4. total wage elasticity = $\frac{w}{L} \frac{\partial L}{\partial Y}$
5. substitution elasticity = $\frac{w}{L} \frac{\partial L}{\partial Y} - \frac{E}{L} \frac{\partial L}{\partial Y}$

Mean values of the wage rate (W), hours worked per year (L), the income measure (Y) selected (either nonearnings income, Vt, or total family income less earnings of the head, Z), and the earnings of the family head (E) were used in the computations.

The estimates for both the substitution effect and substitution elasticity corresponding to the (Z) income variant were calculated based on the assumption that the cross-substitution effect between the family head's and other family members' leisure was equal to zero.[5] This assumption was considered justified on the grounds that a family head may not have a spouse in the household and therefore no other wage earner may exist. Where both husband and wife were in the family,

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[5]The cross-substitution effect for the family head measures the difference in labor supplied by the family head due to a difference in the wage rates of another family member, with income compensated so that the original family income remains unchanged. For a discussion of the cross-substitution term, see: Edward D. Kalachek and Frederic Q. Raines, "Labor Supply of Lower Income Workers and the Negative Income Tax," A paper prepared for the Presidential Commission on Income Maintenance, November, 1969, pp. 9-16; and Cohen, Rea, and Lerman, pp. 184-186.

both did not always work and wage rates were not available for individuals not engaged in market activity.

The direction of bias resulting if the cross-substitution assumption fails to hold depends on the sign of the cross-substitution term. If the leisure of family members is complementary, the income effect is positively biased and the substitution term for the family head is biased in a negative direction.

The estimates shown in Table XII have the expected signs except for the substitution effect and substitution elasticity of the FWFH group. According to traditional theory, the sign of the substitution effect is unambiguously positive. Only in Becker's analysis is allowance made for the possibility of a negative substitution effect.[6] The problem of negative substitution terms for this group is associated with the zero income values utilized in the computation of the term due to nonsignificant income coefficients. Furthermore, the negative and highly significant wage coefficient suggests that the income effect should be of a negative sign. Additional explanation concerning the appropriateness of the income measure is discussed in the final section of this chapter.

Interactions

The effects of various interactions on both income and wage variables were explored. In cases where interactions were

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[6]Gary S. Becker, "A Theory of the Allocation of Time," Economic Journal, LXXV (September, 1965), p. 505. Becker's hypothesis is not stated here, but is deserving of further empirical investigation on on this group.

TABLE XII

ESTIMATES OF INCOME AND SUBSTITUTION EFFECTS
AND ELASTICITIES FOR THE
FAP SAMPLE

Items	FWFH WORKERS (Vt) Income Variant	FWFH WORKERS (Z) Income Variant	FWPH WORKERS (Vt) Income Variant	FWPH WORKERS (Z) Income Variant	PWFH WORKERS (Vt) Income Variant	PWFH WORKERS (Z) Income Variant	PWPH WORKERS (Vt) Income Variant	PWPH WORKERS (Z) Income Variant
Income and substitution effects of wage differences								
Income effect	0.0	0.0	-424.1	-231.6	-240.5	-143.9	-117.9	-59.6
Substitution effect	-57.3	-57.3	339.4	130.4	240.5	143.9	117.9	59.6
Elasticities								
Income elasticity	0.0	0.0	-0.054	-0.072	-0.043	-0.059	-0.140	-0.128
Wage elasticity	-0.039	-0.039	-0.143	-0.163	0.0	0.0	0.0	0.0
Substitution elasticity	-0.039	-0.039	0.279	0.067	0.293	0.138	0.419	0.212
Mean Values								
Dependent variables:								
hours worked per year	2285.0		1483.0		1263.0		664.0	
wage rate	1.55		1.62		1.54		1.67	

significantly, modifications of the income and substitution effects and elasticities were made. Interaction variables used in this study were selected on an a priori basis. The interaction effects of each of the following factors with the wage and income variables were considered separately: (1) race, (2) sex, (3) health constraint on hours worked, (4) educational level, and (4) age. In addition, the interactions of the following combined factors with the wage and income variables were also analyzed: (5) race and sex, (6) race and health constraint on hours worked, (7) race and age, (8) race and education, and (9) age and health constraint on hours worked.

Since the interaction terms incorporate dummy variables, the coefficient of the wage variable is the wage coefficient corresponding to the omitted class in the set of dummy classifications. For example, if the regression equation were $L = b_1 w + b_2 V_t + b_3 O_{sx} w + b_4$ Osx V_t, then b_1 is the wage coefficient corresponding to the omitted dummy class, male. The wage coefficient for females would equal $b_1 + b_3$. A similar interpretation is applicable to the income measure (Vt).[7]

A statistically significant "t" value for b_3 indicates that the wage coefficient associated with this dummy classification differs statistically from the wage coefficient of the omitted class. Specifically, the female wage coefficient differs statistically from the male wage coefficient. It is thus necessary to present estimates for the omitted class as well as the class depicted by a significant interaction term for comparative purposes.

The income and substitution effects and the various elasticities

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[7]See J. Johnston, Econometric Methods, (New York, 1960), pp. 221-228.

are modified for the different groups of the FAP sample in cases where significant interactions were discovered. These estimates are presented in Table XIII for the omitted class (OC) as well as the dummy class associated with the significant interaction term.

Table XIII should be helpful in demonstrating the effects of interactions related to the various groups of the FAP sample. Only significant interactions are reported in the table. Interactions are shown for each group as well as both the Vt-income and Z-income variants. The economic interpretation of significant interaction terms is largely deferred to the final chapter.

Under the FWFH heading of the Vt-income variant, in the table, there are four numbered groupings, representing different regressions in which significant interactions were found. The first grouping is interpreted as indicating that black family heads differ from white family heads (OC) in the number of hours supplied per year associated with wage differences; however, no difference in hours supplied due to income differences is noted. The total wage, income, and substitution elasticities are also shown in the table. Each elasticity was calculated based on the wage and income coefficients. For these calculations, nonsignificant coefficients are assumed equal to zero. The "t" statistic for the coefficients of the omitted class indicates statistical difference from zero; however, the "t" statistic for the coefficients of the other classes indicate statistical difference from the omitted class. The remainder of the table may be interpreted in the same fashion. Comparisons of various interaction effects are presented in the concluding section to this chapter.

Specifying the various interaction terms did not alter the

TABLE XIII

ESTIMATES OF INCOME AND SUBSTITUTION EFFECTS AND ELASTICITIES BASED ON SIGNIFICANT INTERACTIONS FOR THE FAP SAMPLE

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
			Vt-Income Variant			
FWFH						
1. White (OC)[a]	-35.19 (2.08)	-0.027	-0.0772 (0.70)	_____(b)	-0.027	0.279
Black	-178.2483 (3.34)	-0.115	(N.S)[c]	_____(b)	-0.115	
2. Male (OC)	-59.08 (3.78)	-0.042	-0.0160 (0.19)	_____(b)	-0.042	0.265
Female	-158.52 (2.45)	-0.081	(N.S)	_____(b)	-0.081	
3. White, Male (OC)	-36.64 (2.17)	-0.029	0.0302 (0.14)	_____(b)	-0.029	0.309
Black, Male	-184.63 (3.45)	-0.125	(N.S)	_____(b)	-0.125	
Black, Female	-276.37 (3.94)	-0.144	(N.S)	_____(b)	-0.144	

TABLE XIII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
4. White, No Health Constraint (OC)	-35.30 (2.08)	-0.027	-0.1815 (1.07)	_____(b)	-0.027	0.289
Black, No Health Constraint	-180.84 (3.39	-0.117	(N.S)	_____(b)	-0.117	
Black, with Health Constraint	-281.85 (2.15)	-0.161	(N.S)	_____(b)	-0.161	
FWPH						
1. Male (OC)	-8.80 (0.16)	_____(b)	-0.3983 (4.09)	-0.057	0.677	0.428
Female	-139.14 (2.34)	-0.133	-0.1005 (2.00)	-0.029	-0.028	
2. White, Male (OC)	-19.20 (0.34)	_____(b)	-0.3862 (2.20)	-0.036	0.670	0.466
White, Female	-447.79 (3.70)	-0.457	(N.S)	-0.112	0.022	
PWFH						
1. Black, age 25-54 (OC)	3.41 (0.22)	_____(b)	-0.0316 (1.77)	_____(b)	_____(b)	0.419

TABLE XIII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
Black, 55 and older	(N S)	_____(b)	-0.4378 (2.93)	-0.187	0.398	
PWPH						
1. White, age 25-54 (OC)	-21.05 (0.40)	_____(b)	-0.2002 (2.04)	-0.142	0.557	0.481
White, less than 25	-230.52 (2.46)	-0.762	(N.S)	-0.136	-0.100	
2. Age 25-54, No Health Constraints (OC)	-25.38 (0.62)	_____(b)	-0.2377 (4.39)	-0.161	0.563	0.511
Over age 54, with Health Constraint	880.21 (3.48)	1.821	(N.S)	-0.239	2.455	
FWFH						
1. White (OC)	-34.13 (2.02)	-0.026	-0.0087 (0.12)	_____(b)	-0.026	0.283
Black	-184.40 (3.49)	-0.119	(N.S)	_____(b)	-0.119	
2. Male (OC)5	-59.83 (3.83)	-0.043	-0.0227 (0.69)	_____(b)	-0.043	0.267

TABLE XIII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
Female	-211.13 (2.35)	-0.107	(N.S)	_____(b)	-0.107	
3. White, Male (OC)	-36.49 (2.17)	-0.029	0.0278 (0.34)	_____(b)	-0.029	0.317
Black, Male	-193.87 (3.65)	-0.132	(N.S)	_____(b)	-0.132	
Black, Female	-285.56 (4.01)	-0.148	(N.S)	_____(b)	-0.148	
4. White, No Health Constraint (OC)	-34.10 (2.02)	-0.026	-0.0133 (0.17)	_____(b)	-0.026	0.290
Black, No Health Constraint	-185.68 (3.51)	-0.120	(N.S)	_____(b)	-0.120	
Black, With Health Constraint	-304.96 (2.11)	-0.174	(N.S)	_____(b)	-0.174	
5. White, Age 25-54 (OC)	-34.94 (2.06)	-0.027	0.005 (0.06)	_____(b)	-0.027	0.307
Black, Age 25-54	-195.01 (3.66)	-0.127	(N.S)	_____(b)	-0.127	

TABLE XIII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
6. White, 12 yrs. Education (OC)	-152.12 (2.69)	-0.102	0.6985 (4.17)	0.068	-1.164	0.365
Black, less than 12 yrs. Education	(N.S)	-0.100	-0.0485 (4.38)	-0.007	-0.042	
Black, more than 12 yrs. Education	(N.S)	-0.112	-0.4241 (2.91)	-0.035	0.392	
FWPH						
1. Male (OC)	-18.86 (0.35)	_____(b)	-0.2017 (3.42)	-0.086	0.343	0.403
Female	-159.43 (2.41)	-0.152	(N.S)	-0.108	0.058	
2. White, male	-23.88 (0.39)	_____(b)	-0.2295 (2.32)	-0.073	0.3970	0.447
White, female	-476.24 (3.77)	-0.486	(N.S)	-0.104	-0.201	
3. White, no health constraint	-56.17 (0.94)	_____(b)	-0.1838 (1.97)	-0.064	0.316	0.407

TABLE XIII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
Black, health constraint	-543.56 (2.13)	-0.485	(N.S)	-0.068	-0.281	
PWPH						
1. 12 yrs. Educ. (OC)	-101.20 (1.63)	_____(b)	0.0949 (1.07)	_____(b)	_____(b)	0.404
Less than 12 yrs. Educ.	(N.S)	_____(b)	-0.1048 (2.14)	-0.148	0.245	
More than 12 yrs. Educ.	(N.S)	_____(b)	-0.4428 (2.24)	-0.138	0.151	
2. White, male (OC)	-55.61 (1.06)	_____(b)	-0.1442 (1.71)	_____(b)	_____(b)	0.425
White, female	(N.S)	_____(b)	0.1270 (2.17)	0.151	-0.257	
3. White, no health constraints (OC)	-107.72 (2.18)	-0.292	0.0187 (0.27)	_____(b)	-0.218	0.390
Black, no health constraints	-3.21 (2.11)	-0.007	(N.S)	_____(b)	-0.007	

TABLE XIII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
4. White, age 25-54 (OC)	-23.09 (0.43)	_____(b)	-0.1700 (2.17)	-0.233	0.473	0.460
White, less than 25	-283.36 (2.46)	-0.938	(N.S)	-0.219	-0.375	
White, 55 and older	(N.S)	_____(b)	0.2661 (2.73)	0.425	-0.8169	
5. White, 12 yrs. educ. (OC)	-166.64 (1.23)	_____(b)	0.2004 (1.61)	_____(b)	_____(b)	0.459
Black, less than 12 yrs. education	(N.S)	_____(b)	-0.1064 (2.37)	-0.161	0.222	

Notes: a. (OC) indicated the omitted class for dummy variables.
b. The estimate is equal to zero because insignificant coefficients are assumed to be equal to zero.
c. (N.S) The coefficient is not statistically different from the coefficient of the omitted class, thus, the coefficient for omitted class was used for computations. "t" values are in parentheses, sign omitted.

negative substitution elasticity estimates. One departure from this generalization, was found for black family heads with more than twelve years of education. A positive substitution elasticity was obtained for these family heads.

Market Variables

Three market variables were included in selected regressions as surrogates for the demand conditions facing the individual. (1) A dummy variable (Odq) was added which assumed a value of unity if the reason given for the family head working part-time was considered due to demand conditions. (2) The unemployment rates for each of the twelve large SMSA's by color and central city designation were utilized.[8] (3) An employment change variable associated with each of the twelve enumerated SMSA's was also utilized.

The variable (Odq) was added to regression equations which included the variables presented in Table X. The coefficient for (Odq) was significant for only the PWFH group. The estimate was -372.24 (t = 3.80**) and -325.30 (t = 3.33**) for regressions with (Vt) and (Z) as income measures respectively. The coefficient is to be interpreted in the following manner, using the Z-income variant of the equation as an example. The family heads who reported that the reason for their working part-time was due to demand conditions worked 325 hours less per year than did the family heads who reported other reasons for part-time work.

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[8]See the discussion in Chapter III for a more detailed presentation of both the unemployment and employment change variable.

It should be noted that only 24 of the 167 FWPH family heads associated their inability to work full-time with demand conditions. There was no evidence of intercorrelation between (Odq) and any of the wage and income variables.

Unlike the variable (Odq), the unemployment rate and rate of employment change variables could only be applied to regression where the sample size of the various groups was further reduced. Observations on these variables were available only for the 12 large SMSA's mentioned in Chapter III. The various groups of the FAP and other samples were restricted to include only families living in one of the 12 large SMSA's so that regressions incorporating these two market variables could be estimated.

The unemployment rate was included in the regression equation as one of three dummy variables: (Oul), (Oum), or (Ouh). These variables indicated low, medium, and high unemployment rates according to rates of less than 3.0 per cent, 3.1 to 5.0 per cent and greater than 5.0 per cent, respectively. An employment variable (in per cent) was also used in selected regressions. This variable was included in regressions as one of three dummy variables: (Oml), (Omm), or (Omh) associated with employment changes of a specific SMSA of less than 3.5 per cent, 3.5 - 5.0 per cent, or greater than 5.0 per cent respectively. These dummy variables are intended to represent low, medium, and high rates of employment change respectively.

Only in the FWFH group was statistical significance accorded to one of the employment change variables. Family heads living in SMSA's with high rates of employment change (Omh) supplied approximately 168 more hours per year than did heads living SMSA's characterized by low

rates of employment change (Oml). This was the expected result, but no statistical difference was found between the (Omm) and (Oml). No interactions between the employment change variables and either the wage or income measures were discoverd.

Several interesting results were obtained in regressions specified to include both the unemployment rate and employment change variables. It was not surprising to find some intercorrelation between the unemployment variables and the rate of employment change variables in all four groups. For the FWFH group, family heads living in SMSA's with high unemployment rates appeared to be more responsive to differences in the wage rate than heads living in SMSA's with low unemployment rates. Due to intercorrelation problems in all groups, the net effect of the wage rate could not be determined when these market variables were included in regression. Also, the number of observations for the dummy variables and interactions associated with the market variables were too small to produce reliable estimates. Even if reliable estimates could be obtained, it is not clear that the results of the groups restricted to the large SMSA's can be compared to the results obtained using the larger sample size groups.

The unsuccessful efforts to measure demand conditions by the rate of change of employment have been experienced by others.[9] Cohen, Rea, and Lerman have worked with both the unemployment and employment change

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[9]See Edward D. Kalachek and Frederic Q. Raines, "Labor Supply of Lower Income Workers and the Negative Income Tax," A paper prepared for the Presidential Commission on Income Maintenance, November, 1969.

variables and have obtained somewhat better results in their studies.[10]

WNP-C Sample

Results for the working near-poor with children are shown in Table XIV. The findings are presented for each of the four work classifications.

Estimated Coefficients

Good results for the wage variable (W) were obtained for this sample. The wage coefficient was statistically significant for all groups except the PWPH group. The signs of the significant coefficients were as expected. The absolute value of the wage estimate for the PWFH group was almost two and a half times that of the FWFH and FWPH groups, indicating a greater difference in hours worked associated with a difference in the wage rate for the PWFH group. The income measures, (Vt) and (Z), were significant only for the FWPH and PWFH groups.

The coefficient for net assets (NA) was statistically significant only in the FWFH group, while the estimate for total debt (D) was significant only in the FWPH group. Neither the sign for (D) nor (NA) were as expected. Although intercorrelation existed between (D) and other independent variables, the negative association remained after dropping the variables correlated with (D) from the regression. The negative sign for (NA) is consistent with the findings by Egge and

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[10] Cohen, Rea, and Lerman, A Micro Model of Labor Supply. Their study included market variables mostly in the context of a labor force participation model rather than as hours of work model.

TABLE XIV

REGRESSION RESULTS BASED ON TOTAL HOURS WORKED
PER YEAR AS THE DEPENDENT VARIABLE,
WNP-C SAMPLE

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	2095	2105	2411	2535	1658	1662	1402	1260
W	-56.74**	-56.15**	-43.22*	-52.84*	-122.77*	-138.37*	16.14	18.34
	(3.61)	(3.58)	(2.46)	(3.09)	(2.24)	(2.62)	(1.22)	(1.36)
Vt	0.0414	-------	-0.2883**	-------	-0.2508*	-------	-0.1195	-------
	(0.81)	-------	(3.46)	-------	(2.79)	-------	(1.21)	-------
Z	-------	0.0410	-------	-0.1972**	-------	0.2274**	-------	-0.0969
	-------	(1.58)	-------	(4.02)	-------	(3.74)	-------	(1.31)
NA	0.0110*	0.0109*	0.0332	0.0312	-0.0141	-0.0153	0.0203	0.0233
	(2.01)	(2.00)	(1.69)	(1.62)	(0.61)	(0.69)	(0.86)	(1.01)
D	-0.0006	0.0001	-0.0529*	-0.0561*	0.0042	0.0117	0.0010	0.0017
	(0.09)	(0.01)	(2.28)	(2.46)	(0.12)	(0.38)	(0.03)	(0.04)
C	14.27	12.07	82.00*	108.45*	-18.75	-20.77	-8.14	-2.08
	(1.21)	(1.02)	(2.67)	(3.37)	(0.59)	(0.68)	(0.21)	(0.05)
Ow	-7.48	-36.88	-45.15	118.13	-50.54	16.99	-3.69	117.01
	(0.13)	(0.61)	(0.33)	(0.84)	(0.27)	(0.09)	(0.02)	(0.53)
Om	297.66	287.22	-491.34	-717.22*	305.09	306.54	-52.21	-20.37
	(1.55)	(1.51)	(1.41)	(2.08)	(0.95)	(0.99)	(0.09)	(0.04)

TABLE XIV (Continued)

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Oh	-74.38	-87.86	-262.93	-356.69	-161.89	-108.62	-189.62	-201.75
	(0.74)	(0.87)	(1.12)	(1.62)	(0.73)	(0.47)	(0.97)	(1.03)
Orb	-124.59*	-131.99*	-214.41	-110.96	-32.99	76.02	291.01	296.60
	(2.64)	(2.78)	(1.73)	(0.94)	(0.23)	(0.54)	(1.63)	(1.67)
Osx	153.02	148.92	-634.26	-815.53*	110.52	147.11	-495.24	-397.66
	(0.76)	(0.74)	(1.82)	(2.38)	(0.33)	(0.47)	(0.92)	(0.77)
Oag1	-25.15	-16.29	140.63	110.06	-188.11	-195.39	57.24	88.00
	(0.31)	(0.20)	(0.69)	(0.55)	(1.10)	(1.19)	(0.29)	(0.45)
Oag3	67.07	45.31	342.35	231.86	82.32	169.55	-151.65	10.64
	(0.72)	(0.48)	(1.39)	(0.97)	(0.46)	(0.98)	(0.57)	(0.03)
Oed1	60.27	54.63	-269.55*	-178.90	-54.77	-32.22	-434.16	-367.53
	(1.19)	(1.08)	(2.00)	(1.38)	(0.34)	(0.21)	(1.83)	(1.58)
Oed3	242.60*	241.54*	32.30	-55.08	464.94	362.65	287.67	325.81
	(2.43)	(2.43)	(0.11)	(0.19)	(0.91)	(0.74)	(0.55)	(0.62)
R2	0.333	0.339	0.569	0.592	0.493	0.552	0.617	0.621
N	376	376	106	106	77	77	49	49

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

support the conclusion that leisure may be an inferior good for this group of workers.[11] The negative sign for (D) lends support to the hypothesis that debt incurred by this group resulted from the purchase of time intensive consumption goods.

The number of children (C), sex of the family head (Osx), and level of education less than 12 years (Oed1) were found significant in the FWPH group. (Osx) and (Oed1) were significant only for the (Z) and (Vt) variant of the regression respectively, with each estimate having the expected sign. Intercorrelation was discovered between (Osx) and both (Om) and (Ow). It was found, in unreported regressions, that (Osx) failed to be significant when either (Ow) or (Om) were removed from the equations.

The dummy variable for black family heads (Orb) was significant solely in the FWFH group. This estimate was of the expected sign, indicating that black heads worked fewer hours per year than white heads. Blacks accounted for 220 of the total 376 family heads in this group (Oed3) was also significant in the FWFH group and the coefficient had the expected sign. This result indicates that family heads with more than twelve years of education (Oed3) worked significantly more hours per year than did family heads with just 12 years of education.

Intercorrelation

Intercorrelations of the various independent variables with (Vt),

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[11]Karl Egge, "Intercolor Differences in Labor Supply Among Older Men," presented at the Winter Meetings of the Econometric Society, New York, December 30, 1969, p. 23.

(Z), and (W) appreared not to be a serious problem for the WNP-C sample. The weak intercorrelations that were present in all groups involved the two income measures (Vt) and (Z) with (W) and (C). Additionally, in the FWPH group these income measures were also slightly correlated with (Oh). Minor intercorrelation between (W) and both (Ow) and (Om) existed in the PWFH group.

The intercorrelations are referred to as minor since the value of the coefficients for each of the income and wage variables remained substantially stable, when using Melichar's procedure, as discussed in the FAP sample. Intercorrelations among the other independent variables were found to exist but since these intercorrelations did not affect the wage and income coefficients, they are not relevant to this study.

Presented in Table XV are the regression results for equations omitting all variables which are shown in Table XIV as being insignif-icant.

Income and Substitution Terms

Income and substitution effects and the various elasticities similar to those developed for the FAP sample are presented in Table XVI. Other than the substituion terms for the FWFH group, the signs of the various estimates are the expected ones. An explanation for the negative substituion terms was suggested in the discussion of the FAP sample and further discussion will be provided in a later section. The wage coefficients for both income variants of the PWPH group were found nonsignificant, resulting in positive substitution terms.

TABLE XV

REGRESSION RESULTS FOR EQUATIONS INCLUDING ONLY SIGNIFICANT VARIABLES;
DEPENDENT VARIABLE: TOTAL HOURS WORKED PER YEAR,
WNP-C SAMPLE

	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
Independent Variable	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	2454.20	2435.2	1884.7	2204.9	1656.0	1792.7	1019.5	1066.6
W	-52.87** (3.42)	-50.96** (3.31)	-41.52* (2.44)	-54.34** (3.30)	-89.03* (2.12)	-109.85* (2.64)	8.70 (0.74)	9.79 (0.82)
Vt	0.0275 (0.58)	-------	-0.2890** (3.76)	-------	-0.2864** (3.78)	-------	-0.1684* (2.16)	-------
Z	-------	0.0461 (1.963)	-------	-0.2103** (4.61)	-------	-0.2096** (4.52)	-------	-0.1150 (2.05)
NA	0.0131* (2.48)	0.0127* (2.41)	-------	-------	-------	-------	-------	-------
D	-------	-------	0.0389 (1.71)	0.0423* (2.27)	-------	-------	-------	-------
C	-------	-------	48.77 (1.78)	86.82* (3.03)	-------	-------	-------	-------
Orb	-128.12** (2.87)	-143.65** (3.18)	-------	-------	-------	-------	-------	-------
Oed1	-------	-------	-242.23 (1.88)	-------	-------	-------	-------	-------

TABLE XV (Continued)

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Oed3	187.62* (2.03)	197.37* (2.15)	-------	-------	-------	-------	-------	-------
Om	-------	-------	-------	-418.65 (1.32)	-------	-------	-------	-------
Osx	-------	-------	-------	-605.78 (1.88)	-------	-------	-------	-------
N	376	376	106	106	77	77	49	49
R2	0.287	0.302	0.472	0.532	0.420	0.48	0.309	0.295

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

TABLE XVI

ESTIMATES OF INCOME AND SUBSTITUTION EFFECTS
AND ELASTICITIES FOR THE
WNP-C SAMPLE

Items	FWFH WORKERS (Vt) Income Variant	FWFH WORKERS (Z) Income Variant	FWPH WORKERS (Vt) Income Variant	FWPH WORKERS (Z) Income Variant	PWFH WORKERS (Vt) Income Variant	PWFH WORKERS (Z) Income Variant	PWPH WORKERS (Vt) Income Variant	PWPH WORKERS (Z) Income Variant
Income and substitution effects of wage differences								
Income effect	0.0	0.0	-462.3	-336.4	-391.7	-286.7	-157.5	-107.5
Substitution effect	-52.9	-51.0	420.3	282.0	320.7	176.8	157.5	107.5
Elasticities								
Income elasticity	0.0	0.0	-0.077	-0.158	-0.068	-0.135	-0.118	-0.171
Wage elasticity	-0.046	-0.045	-0.066	-0.086	-0.142	-0.175	0.0	0.0
Substitution elasticity	-0.046	-0.045	0.552	0.364	0.649	0.404	0.663	0.453
Mean values								
Dependent variable: hours worked per year	2314.0		1560.0		1368.0		935.0	
Wage rate	2.02		2.54		2.19		2.92	

Interaction Effects

The same set of interaction terms as discussed in the FAP sample was tested for statistical significance in the WNP-C sample. Also the same procedures as used in the previous sample to derive the income and substitution terms and elasticities are followed in this sample. These calculations and the wage and income coefficients for the various significant interactions are presented in Table XVII. The table can be interpreted in the same manner as Table XIII.

Market Variables

The market variables discussed in the FAP sample were included in various unreported regressions on the different groups of workers in the WNP-C sample. The variable (Odq) failed to be significant at the five per cent level for any equation in which it was included.

None of the various unemployment rates or employment change dummy variables was found significant for this sample. In the FWFH group, however, the interaction terms of the wage variable and each of the employment change variables (Omm and Omh) were found to be significant. Intercorrelations with other independent variables masked the net effect of these variables. It did appear that the wage coefficients for family heads living in either SMSA's of medium and high rates of employment change were negative as opposed to the positive wage coefficient for heads living in SMSA's of low rates of employment change. The wage coefficient for those living in SMSA's of high rates of employment change appeared to be of a smaller negative magnitude than the coefficient for those in SMSA's of medium rates of employment change.

TABLE XVII

ESTIMATES OF INCOME AND SUBSTITUTION EFFECTS AND ELASTICITIES
BASED ON SIGNIFICANT INTERACTIONS FOR THE
WNP-C SAMPLE

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
			Vt-Income Variant			
FWFH						
1. White (OC)	-195.22 (4.58)	-0.169	-0.1580 (1.69)	_____(b)	-0.169	0.347
Black	-32.60 (3.57)	-0.138	0.0796 (2.21)	0.058	-0.167	
2. Male (OC)	-54.21 (3.53)	-0.049	0.1021 (1.40)	_____(b)	-0.049	0.321
Female	-158.45 (2.41)	-0.112	(N.S)	_____(b)	-0.112	
3. Age 25-54	-50.38 (3.26)	-0.053	-0.0146 (0.28)	_____(b)	-0.053	0.311
Over age 54	(N.S)	-0.032	0.2381 (1.97)	0.034	-0.332	
4. Twelve yrs. of education (OC)	-71.30 (2.84)	-0.068	-0.1832 (1.71)	_____(b)	-0.068	0.316

TABLE XVII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
Less than 12 yrs. of education	(N.S)	-0.063	-0.0018 (2.16)	-0.0001	-0.057	
5. White, Male (OC)	-203.73 (4.82)	-0.178	-0.1383 (1.30)	_____(b)	-0.178	0.392
Black, Male	-32.95 (3.78)	-0.030	0.2674 (2.84)	0.011	-0.514	
6. White, no health constraint (OC)	-208.30 (4.83)	-0.181	-0.1510 (1.62)	_____(b)	-0.181	0.364
Black, no health constraint	-33.59 (3.80)	-0.023	0.076 (2.11)	0.006	-0.164	
7. White, age 25-54	-204.79 (4.79)	-0.179	-0.1896 (1.99)	-0.008	0.187	0.385
White, over 54	-418.57 (2.44)	-0.356	(N.S)	-0.003	-0.073	
Black, less than 25	-54.90 (2.02)	-0.042	(N.S)	-0.0002	0.252	

TABLE XVII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
FWPH						
1. White (OC)	-55.91 (1.05)	_____(b)	-0.1816 (1.95)	_____(b)	_____(b)	0.514
Black	(N.S)	_____(b)	-0.5286 (2.22)	-0.108	1.094	
2. Age 25-54 (OC)	-37.53 (1.68)	_____(b)	-0.3392 (4.36)	-0.095	0.739	0.551
Over age 54	(N.S)	_____(b)	0.3145 (2.93)	0.134	-0.623	
3. White, no health constraint (OC)	-77.04 (1.39)	_____(b)	-0.1575 (1.15)	_____(b)	_____(b)	0.551
Black, with health constraint	-516.18 (2.02)	-.811	(N.S)	_____(b)	-.811	
Black, no health constraint	(N.S)	_____(b)	-0.5506 (2.07)	-0.108	1.162	
PWFH						
1. White (OC)	-189.84 (2.06)	-0.182	-0.0759 (0.61)	_____(b)	-0.182	0.474

TABLE XVII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
Black	(N.S)	-0.107	-0.3897 (2.12)	-0.172	0.705	
2. Male (OC)	-96.11 (2.28)	-0.167	-0.0490 (0.36)	_____(b)	-0.167	0.476
Female	(N.S)	-0.139	-0.3378 (2.16)	-0.053	0.428	
3. White, Male (OC)	-106.95 (1.99)	-0.201	-0.0186 (0.12)	_____(b)	-0.201	0.507
Black, female	(N.S)	-0.249	-0.4149 (2.17)	-0.155	0.542	
PWPH						
White, no health constraint (OC)	28.88 (0.51)	_____(b)	-0.1039 (0.89)	_____(b)	_____(b)	0.464
Black, no health constraint	203.66 (2.14)	0.351	(N.S)	_____(b)	0.351	
			Z-Income Variant			
FWFH						
1. White (OC)	-190.46 (4.43)	-0.165	-0.0241 (0.53)	_____(b)	-0.165	0.350

TABLE XVII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	
Black	-32.93 (3.45)	-0.027	(N.S)	_____(b)	-0.027	
2. Male (OC)	-53.05 (3.46)	-0.048	0.0383 (1.47)	_____(b)	-0.048	0.328
Female	-162.79 (2.51)	-0.116	(N.S)	_____(b)	-0.116	
3. Age 25-54 (OC)	-46.42 (2.99)	-0.044	0.0249 (0.94)	_____(b)	-0.044	0.324
Over age 54	(N.S)	-0.030	0.1303 (2.03)	0.072	-0.190	
4. White male (OC)	-201.49 (4.69)	-0.176	-0.0226 (0.48)	_____(b)	-0.176	0.380
White female	-430.11 (2.14)	-0.334	(N.S)	_____(b)	-0.334	
Black male	-33.13 (3.67)	-0.030	(N.S)	_____(b)	-0.030	
5. White, age 25-54 (OC)	-208.34 (4.64)	-0.182	-0.0256 (0.48)	_____(b)	-0.182	0.397
Black, under age 25	-37.14 (2.19)	-0.028	(N.S)	_____(b)	-0.028	

TABLE XVII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	
White, over age 54	-411.98 (2.29)	-0.350	(N.S)	_____(b)	-0.350	
6. White, 12 yrs. of education (OC)	-212.07 (4.24)	-0.211	-0.0573 (0.59)	_____(b)	-0.211	0.378
Black, less than 12 yrs of education	-31.48 (3.44)	-0.027	(N.S)	_____(b)	-0.027	
Black, more than 12 yrs. of education	-26.82 (3.05)	-0.025	(N.S)	_____(b)	-0.025	
FWPH						
1. Male (OC)	-54.09 (3.33)	-0.093	-0.1555 (3.12)	-0.111	0.271	0.551
Female	(N.S)	-0.059	-0.3326 (2.34)	-0.307	0.397	
2. Age 25-54	-55.37 (2.51)	-0.083	-0.1983 (4.30)	-0.163	0.350	0.556
Over age 54	(N.S)	-0.195	0.2177 (2.07)	0.121	0.626	

TABLE XVII (Continued)

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
PWFH						
1. Male (OC)	-121.45 (2.89)	-0.211	-0.0820 (1.06)	_____(b)	-0.211	0.524
Female	(N.S)	-0.176	-0.1791 (2.10	-0.282	0.125	
2. White, no health constraint (OC)	-167.54 (3.00)	-0.277	0.0052 (0.04)	_____(b)	-0.277	0.562
Black, no health constraint	(N.S)	-0.265	-0.2197 (2.04)	-0.159	0.234	
PWPH						
White, no health constraints (OC)	8.10 (0.14)	_____(b)	-0.0884 (0.77)	_____(b)	_____(b)	0.522
Black, no health constraints	176.12 (2.06)	0.303	(N.S)	_____(b)	0.303	

Notes: a. (OC) indicated the omitted class for dummy variables.
b. The estimate is equal to zero because insignificant coefficients are assumed to be equal to zero.
c. (N.S) The coefficient is not statistically different from the coefficient of the omitted class, thus, the coefficient for omitted class was used for computations. "t" values are in parentheses, sign omitted.

The informational content of these findings for the market variables suggest that the exclusion of these variables from the final regression does not seriously bias the results. The difficulty of making inferences based on the reduced samples of the various groupd associated with large SMSA's was noted in the discussion of the FAP sample.

WP-WC Sample

The regression results for the working poor families without children and primary individuals (the WP-WC sample) are given in Table XVIII.

Estimated Coefficients

It is shown in Table XVIII that the estimated wage coefficient was significant for all groups except FWPH. Even though the estimate had the appropriate sign, the magnitude varied greatly, between the various groups.

Both income measures were significant in the PWFH and PWPH groups; however, only (Vt) was significant in the FWFH group.

The dummy variable (OI), which was equal to unity when the family head was a primary individual, was included in this sample as well as in the WNP-WC sample. The hypothesis that there was no difference in hours worked by primary individuals and the hours worked by heads of families was supported.[12] The coefficient for (OI) was significant

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[12] In the discussion that follows, the term "family heads" is meant to include primary individuals.

TABLE XVIII

REGRESSION RESULTS BASED ON TOTAL HOURS WORKED
PER YEAR AS THE DEPENDENT VARIABLE
WP-WC SAMPLE

	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
Independent Variable	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	3481.8	3471.7	941.4	1042.6	1991.8	1966.0	1099.9	1229.1
W	-739.0**	-774.33**	-31.46	-34.55	-309.1*	-245.97*	-41.47*	-43.32*
	(4.97)	(4.78)	(0.99)	(1.09)	(3.19)	(2.42)	(2.10)	(2.16)
Vt	-0.6189*	-------	-0.3704	-------	-0.6086**	-------	-0.3367**	-------
	(2.61)		(1.31)		(4.05)		(3.60)	
Z	-------	-0.4493	-------	-0.3322	-------	-0.4742**	-------	-0.3484**
		(-1.81)		(1.45)		(3.55)		(3.88)
NA	-0.0019	-0.0004	-0.0034	-0.0036	-0.0146	-0.0234	-0.0013	-0.0017
	(-0.55)	(0.12)	(0.25)	(0.27)	(0.84)	(1.35)	(0.17)	(0.23)
D	-0.0409	-0.0223	-0.0381	-0.0414	0.0555	0.0466	0.0314	0.0272
	(1.50)	(0.80)	(0.64)	(0.70)	(0.71)	(0.58)	(0.90)	(0.79)
OI	-166.20	-138.73	-25.98	-202.79	-222.27	-313.40	-226.03	-328.50*
	(0.85)	(0.70)	(0.10)	(0.66)	(1.49)	(1.91)	(1.85)	(2.59)
Ow	-769.07	-268.77	307.35	359.72	229.42	360.16	-105.51	107.57
	(1.52)	(0.55)	(0.86)	(1.00)	(0.74)	(1.16)	(0.59)	(0.61)
Om	100.49	121.87	6.25	-32.71	255.75	243.71	-135.50	-148.45
	(0.44)	(0.50)	(0.02)	(0.11)	(1.17)	(1.09)	(1.03)	(1.14)

TABLE XVIII (Continued)

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Oh	I72.33	68.65	314.38	-337.99	-226.84	-214.20	-24.50	23.18
	(0.54)	(0.21)	(0.87)	(0.95)	(1.96)	(1.81)	(0.26)	(0.25)
Orb	408.24*	378.33	105.74	106.36	-157.52	-148.77	4.45	-14.80
	(2.19)	(1.95)	(0.57)	(0.58)	(0.93)	(0.86)	(0.05)	(0.17)
Osx	-416.22*	-422.41*	194.96	273.52	232.43	253.44	-90.99	-74.40
	(3.20)	(3.13)	(0.92)	(1.27)	(1.54)	(1.64)	(0.90)	(0.74)
Oag1	873.90*	972.10*	121.59	148.52	-408.97	-389.80	-119.17	-150.58
	(3.10)	(3.20)	(0.51)	(0.63)	(0.81)	(0.76)	(0.65)	(0.83)
Oag3	75.54	46.57	461.14*	428.41*	-159.84	-174.77	-186.12*	-208.73*
	(0.69)	(0.42)	(2.15)	(2.05)	(1.51)	(1.62)	(2.07)	(2.44)
Oed1	-614.79*	-579.16*	65.84	92.74	-161.59	-145.05	-35.86	-54.89
	(2.31)	(2.10)	(0.26)	(0.37)	(0.76)	(0.67)	(0.25)	(0.39)
Oed3	111.12	128.25	-90.17	-10.76	-480.18	-410.88	-108.45	-133.98
	(0.45)	(0.50)	(0.28)	(0.03)	(1.26)	(1.05)	(0.61)	(0.77)
R2	0.786	0.768	0.391	0.398	0.666	0.647	0.537	0.548
N	59	59	77	77	86	86	120	120

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

in the Z-income variant of the PWPH group, but (OI) was correlated with (Z). In an unreported regression, the removal of (Z) from the equation resulted in a coefficient for (OI) of 172.6 and an insignificant "t" statistic of 1.35, thus the coefficient is assumed nonsignificant for both income variants.

(Orb) was found to be significant in the FWFH group, however, these results are obscured by intercorrelation. (Orb) was correlated with (Oag1) and (W). The "t" statistics for (Orb) in unreported regressions were 0.58 and 0.01 when (Oag1) and (W) were removed respectively from the regression equation.

In the FWFH group; (Osx) was found to be statistically significant. This result indicates that female family heads work approximately 400 hours per year less than do male family heads.

Although (Oag1) was significant in both equations for FWFH, intercorrelation existed with (W). In unreported regressions which omitted (W), the estimate for (Oag1) was 218.05 ($t = 0.71$) and 272.7 ($t = 0.88$) for the Vt-income and Z-income variant respectively. In both cases, the coefficients became statistically insignificant.

The older (more than age 54) family heads (Oag3) supplied significantly more hours per year than did the prime-age (25-54 years of age) group for the FWPH group, but significantly fewer hours than the prime-age group for the PWPH group.

(Oed1) was significant in both equations for the FWFH group; however, again intercorrelation masked the coefficients. In unreported regressions when dropping either (Oag1), (Osx), (Orb), (Vt), or (W), the "t" statistic for the (Oed1) coefficient was statistically significant.

Intercorrelation

Several intercorrelations among independent variables were mentioned in the previous section. The discussion in the present section will be limited to intercorrelations involving the wage and income variables.

The wage variable was somewhat correlated with each of the following variables in the FWFH group: (Oed1), (Oag1), (Orb), (Vt), and (Z). The wage variable appeared to be stable for the other groups. For this FWFH group, (Vt) and (Z) were correlated with (Oed1), (Osx), (Orb), (Ow), (Oag1), (D), and (W). When omitting each of the income measures and wage variables in unreported regressions, those independent variables correlated with each were reduced to statistically insignificant values. The only exception was the (Osx) variable.

Minor intercorrelations were found in the remaining groups. It was observed that (Vt) and (Oag3) were slightly intercorrelated for the other groups.

Income and Substitution Terms

Due to the intercorrelations found involving the wage and income variables, equations were estimated which included only the wage and income variables. These results are reported in Table XIX for both the Vt-income and Z-income variants of the regression equation.

The wage and income coefficients corresponding to the FWFH group had coefficient and "t" values of substantially different magnitudes in Table XIX as compared to their magnitudes in Table XVIII. This is the expected result of intercorrelation. Income and substitution estimates are thus, at best, only approximate for this group.

TABLE XIX

REGRESSION RESULTS FOR EQUATIONS INCLUDING ONLY SIGNIFICANT VARIABLES;
DEPENDENT VARIABLE: TOTAL HOURS WORKED PER YEAR,
WP-WC SAMPLE

	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
Independent Variable	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	2792.2	2777.5	1225.5	1243.2	1537.1	1468.1	743.1	736.8
W	-464.88** (3.62)	-438.24** (3.42)	-33.72 (1.19)	-33.73 (1.19)	-249.96* (2.73)	-205.09* (2.11)	-44.60* (2.28)	-40.94* (2.03)
Vt	-0.1525 (1.85)	-------	-0.2160 (0.86)	-------	-0.6124** (4.94)	-------	-0.3830** (5.02)	-------
Z	-------	-0.1234 (1.52)	-------	-0.1745 (0.96)	-------	-0.4296** (3.87)	-------	-0.2898** (4.06)
N	59	59	77	77	86	86	120	120
R2	0.437	0.419	0.160	0.167	0.533	0.465	0.442	0.378

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

The income and substitution effects as well as the various elasticities were computed based on the coefficients shown in Table XIX and are presented in Table XX. As found in the other samples, the substitution terms for the FWFH group had negative signs. The expected signs for the various computations were obtained for the PWFH and PWPH groups; however, disappointing results were obtained for the FWPH group since both income and wage coefficients were not significant.

Interactions

Few significant interactions were found in this sample. The interactions shown in Table XXI should be interpreted in the same manner as that for similar tables in the previous two samples.

Market Variables

Neither the variable (Odq) nor its interaction with any of the wage or income measures were found significant at the five per cent level for any of the groups.

Due to the small sample size, it was decided not to estimate the market variables based on groups reduced to include only observations for the 12 large SMSA's.

WNP-WC Sample

The regression results for the working near-poor families, including primary individuals, who did not have children in the household are reported in Table XXII.

TABLE XX

ESTIMATES OF INCOME AND SUBSTITUTION EFFECTS
AND ELASTICITIES FOR THE
WP-WC SAMPLE

Items	FWFH WORKERS (Vt) Income Variant	FWFH WORKERS (Z) Income Variant	FWPH WORKERS (Vt) Income Variant	FWPH WORKERS (Z) Income Variant	PWFH WORKERS (Vt) Income Variant	PWFH WORKERS (Z) Income Variant	PWPH WORKERS (Vt) Income Variant	PWPH WORKERS (Z) Income Variant
Income and substitution effects of wage differences								
Income effect	0.0	0.0	0.0	0.0	-681.7	-478.2	-208.0	-157.4
Substitution effect	-464.8	-438.2	0.0	0.0	431.7	273.1	163.4	116.5
Elasticities								
Income elasticity	0.0	0.0	0.0	0.0	-0.143	-0.124	-0.246	-0.244
Wage elasticity	-0.149	-0.140	0.0	0.0	-0.234	-0.195	-0.123	-0.113
Substitution elasticity	-0.149	-0.140	0.0	0.0	0.299	0.179	0.612	0.443
Mean values								
Dependent variable: hours worked per year	2441.0		1136.0		1113.0		543.0	
Wage rate	0.78		1.74		1.06		1.49	

TABLE XXI

ESTIMATES OF INCOME AND SUBSTITUTION EFFECTS AND ELASTICITIES
BASED ON SIGNIFICANT INTERACTIONS FOR THE
WP-WC SAMPLE

Group and Interaction	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Elasticity	R2
			Vt-Income Variant			
FWPH						
1. White male (OC)[a]	-294.39 (3.25)	-0.537	-0.2468 (0.54)	_____(b)	-0.537	0.415
Black male	-24.53 (3.03)	-0.065	(N.S)[c]	_____(b)	-0.065	
			Z-Income Variant			
FWFH						
1. White male (OC)	-150.57 (0.55)	_____(b)	-0.0852 (0.56)	_____(b)		
White female	-813.62 (2.10)	-0.152	(N.S)	_____(b)	-0.152	0.591
FWPH						
1. White male	-299.43 (3.20)	-0.547	-0.0022 (0.006)	_____(b)	-0.547	0.393
Black male	-24.12 (2.98)	-0.064	(N.S)	_____(b)	-0.064	

Notes: a. (OC) indicated the omitted class for dummy variables.
b. The estimate is equal to zero because insignificant coefficients are assumed to be equal to zero.
c. (N.S) The coefficient is not statistically different from the coefficient of the omitted class, thus, the coefficient for omitted class was used for computations. "t" values are in parentheses, sign omitted.

TABLE XXII

REGRESSION RESULTS BASED ON TOTAL HOURS WORKED
PER YEAR AS THE DEPENDENT VARIABLE,
WNP-WC

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	2988.9	3072.6	2008.00	2439.4	1645.9	1670.4	2052.7	1993.3
W	-469.92**	-482.53**	-18.14	-36.27	-2.51	-3.71	-138.82	-169.49
	(4.12)	(4.27)	(0.55)	(0.99)	(0.29)	(0.42)	(1.18)	(1.41)
Vt	-0.1480	--------	-0.6837*	-------	-0.5273*	-------	-0.7674**	-------
	(0.64)		(3.47)		(2.99)		(4.39)	
Z	-------	-0.1964	-------	-0.6074*	-------	-0.4304*	-------	-0.6074**
		(1.21)		(2.63)		(2.65)		(4.41)
NA	-0.0246	-0.0257	0.0361	-0.0064	-0.0158	-0.0195	0.0045	0.0028
	(0.93)	(0.98)	(0.59)	(0.09)	(0.87)	(1.04)	(0.30)	(0.18)
D	0.0313	0.0306	-0.0427	-0.0344	-0.113	-0.0885	0.1062	0.0108
	(0.89)	(0.90)	(0.29)	(0.21)	(1.75)	(1.35)	(1.15)	(0.12)
OI	49.33	-43.96	284.97	-99.21	-330.34	-474.52	-510.29	-260.30
	(0.27)	(0.22)	(0.58)	(0.17)	(1.46)	(1.83)	(2.04)	(1.07)
Ow	11.15	30.62	300.82	543.55	50.32	300.64	-766.25*	102.92
	(0.05)	(0.15)	(0.88)	(1.42)	(0.17)	(0.94)	(3.34)	(0.49)
Om	177.91	122.25	-283.11	-188.70	388.58	308.43	-209.84	226.09
	(0.79)	(0.54)	(0.50)	(0.31)	(1.38)	(1.05)	(0.80)	(0.83)

TABLE XXII (Continued

Independent Variable	FWFH Workers Vt-Income Variant	FWFH Workers Z-Income Variant	FWPH Workers Vt-Income Variant	FWPH Workers Z-Income Variant	PWFH Workers Vt-Income Variant	PWFH Workers Z-Income Variant	PWPH Workers Vt-Income Variant	PWPH Workers Z-Income Variant
Oh	0.1358	5.50	1425.42*	1327.36*	-584.44*	-622.49*	-607.48*	-61.44
	(0.00)	(0.02)	(2.90)	(2.50)	(2.44)	(2.51)	(2.99)	(0.28)
Orb	-115.09	-104.24	-1144.61**	-1165.79**	-135.84	-76.58	-116.03	-15.40
	(0.63)	(0.59)	(3.92)	(3.69)	(0.64)	(0.36)	(0.58)	(0.08)
Osx	-77.71	-79.42	-1025.27*	-837.73*	724.05*	790.16*	50.96	57.37
	(0.38)	(0.40)	(2.78)	(2.15)	(2.55)	(2.67)	(0.29)	(0.33)
Oag1	-391.99	-383.20	-194.44	-407.13	-427.97	-382.84	270.43	-49.97
	(1.63)	(1.62)	(0.43)	(0.83)	(1.19)	(1.04)	(0.95)	(0.18)
Oag3	-96.30	-101.76	-684.19*	-586.96	-293.29	-344.92	85.12	-203.50
	(0.63)	(0.68)	(2.29)	(1.77)	(1.45)	(1.68)	(0.37)	(1.00)
Oed1	-87.96	-59.59	1095.38*	977.63	-256.36	-204.77	-198.31	-302.99
	(0.40)	(0.27)	(2.47)	(2.02)	(0.98)	(0.75)	(0.77)	(1.20)
Oed3	1054.79*	1137.80*	-585.00	-267.93	-1301.33*	-1124.56*	-426.74	-610.11
	(2.99)	(3.18)	(1.07)	(0.49)	(2.78)	(2.36)	(1.14)	(1.65)
R2	0.674	0.684	0.846	0.818	0.782	0.767	0.840	0.841
N	58	58	39	39	40	40	35	35

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

Estimated Coefficients

Only for the FWFH group was (W) found to be significant. The two income measures, (Vt) and (Z), were, however, significant for all groups except the FWFH group. These significant variables all had the expected sign, with some differences in magnitude of the income measure among the various groups.

(Ow) was significant only in the Vt-income variant of the PWPH group. The coefficient for (Ow) is interpreted to mean that a family head with a working wife supplies 766.25 fewer hours than family heads without working wives or than primary individuals.

Family heads with work affecting health constraints, as depicted by (Oh), differed significantly from those with no such constraints for the FWPH, PWFH and the Vt-income variant of the PWPH group. The existence of both positive and negative signs for this variable was discussed earlier as having to do with the comparison made within each specific group of workers.

Black household heads supplied significantly fewer hours (approximately 1150 hours) than their white counterparts in the FWPH group. Female household heads in the FWPH group supplied significantly fewer hours per year than did male heads; however, in the PWFH group, just the opposite is the case.

Household heads aged 55 or more, in the FWPH group, supplied significantly fewer hours than did the 25-54 age group. This is the expected relation. For this same group, heads with less than 12 years of education supplied more hours per year than did heads with 12 years of education. Heads in the FWFH group who had greater than 12 years of education (Oed3) supplied significantly more hours than heads with

only 12 years of education. For the PWFH group, the opposite was true; heads with greater than 12 years of education supplied fewer hours than those with only 12 years of education. It would be expected that these heads with more than 12 years of education classified as part-time would tend to be composed largely of retired workers, thus explaining the negative estimate for (Oed3).

Intercorrelation

Correlations between various independent variables and the wage and income measure were more severe for this sample.

When (Oed3) was dropped from the regression in the FWFH group, the wage variable was estimated to be -356.30* (t = 3.04) and -354.90* (t = 3.05) for the Vt-income and Z-income variant respectively. In other unreported regressions, which omitted (W), the magnitude of the (Oed3) coefficient fell by one half and the "t" statistic was insignificant.

In the FWPH group, (Vt) was slightly correlated with both (Oag3) and (Osx); however, (Z) was found to be somewhat correlated with (W), (Ow), (Orb), (Osx), (Oag3), and (Oed1).

Similar correlation problems also existed for the other two groups. It was found in the PWFH group that (Vt) was correlated with (Oed3), (Oag3), (Osx), and (OI), and that (Z) was correlated with (Oag3), (Osx), (Oh), and (OI). For the PWPH group, (Vt) was correlated with each of the significant independent variables: (Oh), (Ow), and (OI); and (Z) was correlated with (Ow) and (W).

Perhaps the small number of observations each of the groups of this sample is partly responsible for these poor results. It was

found that, although a large number of intercorrelations existed in this sample, the effects of these intercorrelations on the wage and income measures were not so strong as to preclude using the estimates of the wage and income coefficients. The values of these coefficients should be used with caution, however.

Income and Substitution Terms

Equations omitting nonsignificant variables and variables correlated with either the wage or income measures were estimated for each of the four groups. These results are reported in Table XXIII.

Based on Table XXIII, the income and substitution terms and the various elasticities were calculated. These results are shown in Table XXIV. Attempts to modify these various results by specifying equations to include interaction terms were not made due to the small sample size of the various groups.

Market Variables

The interaction between (Odq) and (Vt) was found significant at the five per cent level for the PWPH group. Family heads who reported that the reason for their part-time status was due to demand conditions had a coefficient for (Vt) of -1.7531 ($t = 2.04$) as opposed to a value of -0.8075 ($t = 4.77$) for those who reported other reasons for their part-time status.

Neither (Odq) nor any interaction terms involving (Odq) and the wage or income variables were found significant for any other groups. No attempt was made to estimate the unemployment rate or employment change variables due to the small sample size of the different groups.

TABLE XXIII

REGRESSION RESULTS FOR EQUATIONS INCLUDING ONLY SIGNIFICANT VARIABLES;
DEPENDENT VARIABLE: TOTAL HOURS WORKED PER YEAR,
WNP-WC SAMPLE

	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
Independent Variables	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Intercept	2811.8	2847.9	1564.1	1564.1	1247.20	1288.4	1041.9	1380.33
W	-425.42** (4.35)	-433.20** (4.45)	-66.17 (1.72)	-73.20 (1.97)	-9.07 (1.02)	-10.51 (1.18)	-49.81 (0.48)	-95.37 (1.15)
Vt	-0.1407 (0.77)	-------	-0.6226* (2.49)	-------	-0.4058* (2.51)	-------	-0.4243* (3.14)	-------
Z	-------	-0.1549 (1.21)	-------	-0.5915* (3.08)	-------	-0.3427* (2.37)	-------	-0.5202** (5.68)
Oed3	1036.85* (4.47)	1060.6* (4.62)	-------	-------	-------	-------	-------	-------
R2	0.586	0.595	0.440	0.502	0.414	0.398	0.495	0.713
N	58	58	39	39	40	40	35	35

* = significant at the .05 level
** = significant at the .01 level
"t" values are in parentheses, sign omitted

TABLE XXIV
ESTIMATES OF INCOME AND SUBSTITUTION EFFECTS
AND ELASTICITIES FOR THE
WNP-WC SAMPLE

Independent Variable	FWFH Workers		FWPH Workers		PWFH Workers		PWPH Workers	
	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant	Vt-Income Variant	Z-Income Variant
Income and substitution effects of wage differences								
Income effect	0.0	0.0	-973.8	-925.2	-411.3	-347.4	-303.7	-372.4
Substitution effect	-425.4	-433.2	973.8	925.2	411.3	347.4	303.7	372.4
Elasticities								
Income elasticity	0.0	0.0	-0.105	-0.256	-0.198	-0.233	-0.341	-0.722
Wage elasticity	-0.216	-0.220	0.0	0.0	0.0	0.0	0.0	0.0
Substitution elasticity	-0.216	-0.220	0.991	0.940	0.969	0.819	1.305	1.600
Mean values								
Dependent variable: hours worked per year	2368.0		1564.0		1014.0		716.0	
Wage rate	1.20		2.08		3.66		1.63	

Conclusions

The significant findings supporting policy implication are presented in the final chapter. This final section of the chapter will contain some general considerations and comparisons concerning the empirical findings.

The wage and income effects found for the various groups of the samples analyzed were generally of the theoretically expected sign.[13] Several considerations and comparisons are noteworthy. Consider first the findings concerning the income effect. Negative income effects for the FWPH, PWFH and PWPH groups were obtained in the WNP-C, WP-WC, and WNP-WC samples, with the exception of the FWPH group of the WP-WC sample because of failure to obtain a significant income term.[14] For the WNP-C sample, the larger negative effects were found in the FWPH and PWFH groups; however, in the WP-WC sample the larger negative effect was located in just the PWFH group. The negative income effect for the WNP-WC sample, as in the FAP sample, was larger for the FWPH group.

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[13] It will be recalled that the four samples examined were: the working poor with children (FAP), the working near-poor with children (WNP-C), the working poor without children (WP-WC), and the working near-poor without children (WNP-WC). Each sample was separated into four groups based on the worker's full-time or part-time employment classification: full-time both weekly and hourly (FWFH), full-time weekly, part-time hourly (FWPH), part-time weekly, full-time hourly (PWFH), and part-time both weekly and hourly (PWPH).

[14] Conclusions concerning the various effects on work incentives were drawn from Tables XI, XII; XV, XVI; XIX, XX; and XXIII, XXIV for the FAP, WNP-C, WP-WC and WNP-WC samples respectively. Comparisons of incentive effects are based on comparisons of effects in terms of hours. It should be noted that the PWPH group had the larger negative income elasticity.

The FAP sample had significant wage terms only for the FWFH and FWPH groups, with the larger negative term being associated with the latter. For the WNP-C sample, the PWPH group had the larger negative term. The most substantial negative wage effects for the WP-WC and WNP-C samples were found in the FWFH group.[15] The FWFH group had comparable results between FAP and WNP-C samples and comparable but substantially larger negative results between the WP-WC and WNP-WC samples. Other comparisons of the magnitude of wage effects for the various groups across samples are not as meaningful because of the large number of nonsignificant wage terms obtained. Nevertheless, the largest negative terms for the FWPH and PWFH groups were found in the FAP and WP-WC samples respectively. The only significant wage term for the PWPH group was found in the WP-WC sample.

The sign of the substitution terms calculated for the FWFH groups in all four were not consistent with theoretical expectations. Negative substitution terms were consistently found for the FWFH group in all four samples. A suggested explanation for the negative signs was presented in the discussion of the FAP sample. The explanation for the negative substitution terms was associated with the failure to obtain significant negative income estimates of a sizable magnitude. The only significant income coefficient found for the FWFH group was of a positive sign; the remaining estimates, while a negative sign, were not statistically significant. The assumption that nonsignificant income estimates are equal to zero leads to compensated substitution

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[15]Although the total wage elasticity and the wage effect in terms of hours could be used interchangeably in making comparisons for the FAP and WNP-C samples, such was not the case for the WNP-C and WNP-WC samples.

terms that are not of the expected sign.

It was mentioned in Chapter III that underreporting of income associated with nonearnings income would bias the income effect. This bias is, however, not toward zero and thus would not account for the negative substitution terms.

Due to the concern of the appropriate income measure, regressions were estimated where the income measure was selected from the various sources of transfer income. These categories separately included as income measures were: social security, government pensions, veteran's pension, private pensions, workmen's compensation, unemployment insurance, public assistance and "other" transfers. Selected regression results for the various significant income estimates are presented in Table XXV, along with substitution and income terms and elasticities.

Generally, regressions utilizing income variables based on source of nonearnings income failed to resolve the problem of negative substitution estimates for the FWFH groups. One important exception did occur for the WP-WC sample where, in separate regressions, a social security (Vsoc) and a public assistance (Vpa) income variable had a significant negative coefficient. For both cases, positive substitution terms were estimated.

Fairly good results were obtained using the Vpa-income measure. The coefficients associated with this measure and the resulting substitution elasticities were approximate to those obtained for the nonearnings income (Vt) measure. It should be noted that the results for the income coefficient may be negatively biased if there are institutional restraints on hours worked associated with eligibility to receive particular types of income transfers. Such is the case for

TABLE XXV

SELECTED REGRESSION RESULTS, INCOME AND SUBSTITUTION EFFECTS AND ELASTICITIES BASED ON SIGNIFICANT INCOME MEASURES SELECTED BY SOURCE OF TRANSFER INCOME

Sample and Group	Income Measure	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Effect	Income Effect	Substitution Elasticity	R2
FAP									
FWPH	Vpa	-132.90* (2.74)	-0.145	-0.3170** (3.61)	-0.033	237.1	-470.0	0.321	0.444
PWFH	Vsoc	-3.67 (0.22)	0.0	-0.3194* (2.11)	-0.014	402.4	-403.4	0.492	0.436
	Vpa	-3.80 (0.23)	0.0	-0.1846* (2.18)	-0.020	233.2	-233.2	0.284	0.438
PWPH	Vpa	-11.94 (0.84)	0.0	-0.1820* (3.31)	-0.078	120.9	-120.9	0.430	0.433
WNP-C									
FWPH	Vpa	-47.63* (2.89)	-0.076	-0.6634** (4.95)	-0.055	615.8	-663.4	1.366	0.630
PWFH	Vsoc	-118.25* (2.15)	-0.189	-0.4260* (2.56)	-0.034	464.4	-582.7	0.987	0.479
PWPH	Vpa	13.35 (1.09)	0.0	-0.3391* (2.51)	-0.096	317.1	-317.1	1.333	0.675

TABLE XXV (Continued)

Sample and Group	Income Measure	Wage Variable Coefficient	Wage Variable Elasticity	Income Variable Coefficient	Income Variable Elasticity	Substitution Effect	Income Effect	Substitution Elasticity	R2
WP-WC									
FWFH	Vsoc	-717.13** (4.81)	-0.157	-0.9693* (2.40)	-0.012	1649.0	-2366.1	0.386	0.781
	Vpa	-767.38** (5.04)	-0.246	-1.1876* (2.47)	-0.010	2131.6	-2899.0	0.419	0.783
PWFH	Vsoc	-291.94* (2.85)	-0.278	-0.5042* (2.86)	-0.092	269.2	-561.2	0.161	0.621
	Vpa	-348.29* (3.34)	-0.328	-0.213* (2.16)	-0.023	500.8	-846.1	0.333	0.598
PWPH	Vpa	-38.34 (1.87)	0.0	-0.3984* (1.99)	-0.039	216.4	-216.4	0.784	0.479
WNP-WC									
FWPH	Vui	-14.66 (0.42)	0.0	-1.5389* (2.71)	-0.067	3406.9	-2406.9	2.447	0.820
	Vpa	-7.55 (0.23)	0.0	-1.5056* (3.44)	-0.052	2354.9	-2354.9	2.394	0.845
PWPH	Vpa	-78.97 (0.54)	0.0	-1.9467 (2.37)	-0.083	1393.45	-1393.45	5.076	0.741

NOTES: Vsoc = social security transfers
Vui = unemployment insurance transfers
Vpa = public assistance transfers

"t" values are in parentheses, sign omitted
* = significant at the .05 level
** = significant at the .01 level

unemployment insurance and social security.

One finding should be noted as being contradictory to the expected theoretical considerations. The coefficient for total family income less earnings of the head (Z) should have a larger negative magnitude than the coefficient for nonearnings income (Vt). Such was not the finding; in fact, the opposite was generally the case. Kalachek and Raines found similiar results for male regressions in their study and suggested that a positive cross-substitution effect may be present.[16]

In contrast to Koster's conclusion, based on a different sample, that the substitution elasticity is probably close to zero for the hours component of labor supply, this study supports the finding of a positive term for groups other than the FWFH group. Interactions did support negative findings for the substitution terms for specific classes. But, some negative results would be expected since the substitution estimate is the difference between two random variables.[17]

It is of interest to note which of the demographic groups tested were found to have the larger disincentive effects. Consideration will be given first to the FAP sample.[18] For the FWFH group, black family heads as well as female family heads were found to have larger negative wage effects. This interaction was further refined to illustrate that large wage effects were associated with black male heads and black female heads, with the larger disincentive effect being related to the

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[16]Kalachek and Raines, p. 49.

[17]Cohen, Rea, and Lerman, p. 54.

[18]Comparisons of disincentive effects for demographic groups were obtained from Tables XIII, XVII, and XXI for the FAP, WNP-C, and WP-WP samples respectively.

latter. A large negative wage term was discovered for black family heads with health constraints on hours worked. Large disincentive effects associated with the income term were found for black family heads, both those with more than 12 years of education and those with less than 12 years of education. The former group was the only case in the FWFH group of the FAP sample for which a positive substitution term was calculated.

The demographic groups having the larger disincentive effects for the FWPH group include the following: female family heads, especially white female heads, and black heads with health constraints on hours worked.

For the PWFH group, only one demographic variable was found significant in the interaction specifications.. Black family heads, age 55 and older had a large negative income effect.

For the PWPH group, the larger negative wage effects were associated with white family heads with no health constraints on hours worked and with white heads less than 25 years of age. It is interesting also to note that a large positive wage effect was obtained for family heads who were over age 54 and had health constraints on hours worked. The disincentive effects associated with the income term were greater among family heads with less than 12 years of education and family heads with more than 12 years of education, with the latter category having the large disincentive effect. The former was further specified as being primarily black family heads with less than 12 years of education. Two cases in this group had positive income terms, suggesting leisure may be an inferior good to these groups. They were

white female heads and white family heads over age 55.[19]

Interactions accounting for the effects of various demographic factors on the wage and income variables were also specified for the WNP-C sample. A few significant findings are of interest. First, for the FWFH group, the wage coefficient was negative but of different magnitudes between the sex-race characteristics. White female heads had a larger negative wage coefficient than did white male heads. This is in contrast to the large negative value for the black family female heads in the FAP sample. The wage coefficient for male heads was much smaller, absolutely, for black than for white family heads. Black male heads, however, had a larger negative income term. This was just the opposite of the findings in the FAP sample. As compared with the wage coefficient for white family heads ages 24-54, white family heads over age 54 had a wage coefficient with a much larger negative value while black family heads under age 25 were much less responsive in hours worked due to wage differences. These age-race differences were not significant in the FAP sample.

Concerning the FWPH group, black family heads had a larger negative income effect than white family heads, but this difference was limited to black family heads with no health constraints on the amount of work performed. Black family heads with such health constraints had a very large negative wage term. The older age group, over 54 years of age, had a positive income term indicating that leisure is an inferior good

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[19] It was not tested to see if further specification would have indicated this effect to be associated with white female heads over age 55.

to them. This was not found in the FAP sample.

Two final findings should be mentioned. Black female heads in the PWFH group had a large negative income term. In the PWPH group, black family heads with no constraints on the amount of work performed had a large positive wage term. This latter finding was limited to this sample.

It should be mentioned that interactions of demographic characteristics with the wage and income variables yielded few significant results for the WP-WC group.[20] It was discovered that white female heads in the FWFH group had a large work disincentive associated with the wage effect. Black male heads in the FWPH group a much smaller wage disincentive effect than that for white male heads.

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[20]Such interactions were not specified for the WNP-WC sample due to the small sample size of the different groups.

CHAPTER V

POLICY IMPLICATIONS AND CONCLUSIONS

This study has been concerned with the supply of labor of low income family heads measured in annual hours worked. Attention has been focused on family heads classified in one of four samples:

1. The working poor with children, designated FAP for Family Assistance Plan, is the focal group of current legislative attention. This sample includes only families whose income levels fell below the Social Security Administration's poverty threshold levels, who had children,[1] and who had a working family head.[2]
2. The working near-poor with children designated WNP-C. Included in this sample are families whose income levels were greater than the poverty threshold income levels but less than the low-cost levels, who had children, and who were working family heads.
3. The working poor without children designated WP-WC. This sample consists of families and unrelated primary individuals who were working, who had no children, and had incomes below

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[1] Families were considered to have children if these children were under age 18 or 18 to 21 years of age and in school.

[2] The working family head is a necessary distinction since this study is concerned with hours worked rather than labor force participation as a measure of labor supply.

the poverty threshold levels.

4. The working near-poor without children designated WNP-WC. This sample is composed of families and unrelated individuals who were working, who had income levels between the poverty and low-cost threshold levels, and who had no children.

The FAP sample represents a subset of the families to whom benefits are most likely to be extended under various proposed measures of welfare reform.[3] For this reason the estimated relations for this group should be of particular interest. The remaining three categories provide information that can be used in estimating the labor supply effects on hours of work if program coverage were to be extended even further than is now under consideration.

One of the objectives in this final chapter is to explore the findings concerning the work incentive effects of wage and income subsides. It will be assumed initially that the two basic features of an income subsidy are: (1) an income guarantee or lump sum transfer which is intended to establish a floor under the income of the target group, and (2) a positive marginal tax rate such that the additional income obtained from an extra hour of work will be less than hourly earnings. (In contrast, a wage subsidy scheme is one designed to increase the effective wage rate for individuals with inadequate earnings at pre-subsidy rates.)

Three effects on work incentives can be theoretically separated for analysis. An income effect arising from a positive lump sum transfer will increase the demand for leisure, thus reducing hours worked.

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[3]This group conforms to a major portion of the coverage provided under the Nixon Administration's proposed Family Assistance Plan.

The positive marginal tax rate on earnings incorporated in subsidy schemes produces a wage effect which can be separated into an income and substitution effect. According to traditional theory, the substitution effect of a change in the effective wage rate must have a positive sign so that an increase in hourly earnings results in an increase in hours worked. The income effect of a change in hourly earnings will be negative in sign such that an increased wage rate will increase the demand for leisure as income rises. The empirical investigation of this study provides information concerning these various effects on work incentives for the different samples or target groups.

One important finding is that the effect of various variables, including the wage and income variables, on work effort depends on the worker's full-time or part-time employment classification. Workers were classified as having worked: full-time weekly and hourly (FWFH); full-time weekly, part-time hourly (FWPH); part-time weekly, full-time hourly (PWFH); or part-time both weekly and hourly (PWPH).

Work Incentive Effects

The effects on work incentives differed between the full-time and part-time employment classification.[4] Consider first the income effect on work effort associated with a lump sum money transfer. There appeared to be very little disincentive on work effort corresponding to the income effect for those workers who worked full-time both weekly and hourly in all samples considered. This conclusion is based on the

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[4]The reader is referred to the concluding section of the previous chapter for a slightly more detailed discussion and comparison of the major income and wage effects.

assumption that the statistically insignificant income coefficients were equal to zero. The income effects were generally found to be negative concerning work effort for the other groups of the selected samples. In comparing the income effects for the various groups across samples, it was discovered that similar results existed between the FAP and WNP-C samples and between the WP-WC and WNP-WC samples. The latter set, however, had substantially larger negative effects.[5]

Subsidy schemes containing a marginal tax feature would affect the net wage rate and would be expected to affect hours worked. The marginal tax feature would be positive in the case of an income subsidy and negative in the case of a wage subsidy. This wage effect is composed of opposing income and substitution effects. The net wage effect was found to be negative (income effect dominated) for all cases where a significant wage coefficient was obtained; non-significant coefficients were assumed equal to zero.

An interesting conclusion was made about the income and substitution effect for the FWFH groups. The income effect of a difference in wage rates will be negative, even though the estimated pure income effect is zero. This is true because the wage coefficient, having a significant and negative sign, indicates that leisure is a normal good and that a negative income effect dominates the positive substitution effect. This also suggests that the negative substitution effects calculated for this group in each of the samples selected may be statistical artifacts. The negative income effect of a wage difference

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[5]Comparisons using income elasticities and comparisons based on effects in terms of hours were basically the same when analyzing across samples.

for the FWFH group is probably small for the FAP and WNP-C samples, although the effect appears to be substantially larger for the WP-WC WNP-WC samples.

The income and wage effects were not as homogeneous among family heads with various demographic characteristics as might be implied from the above discussion. Viewing across the different groups in the FAP and WNP-C samples, family heads associated with specific demographic characteristics or combinations of characteristics appear to have larger disincentive effects.[6] It can be concluded that the larger the proportion of individuals in the target population eligible for income maintenance who are in one of the demographic classes having large work disincentive effects the greater will be the reduction in total work effort associated with the transfer payments.

Policy Implications

The differential effects on work incentives within the target group may be of some concern for categorical income maintenance programs. Supplemental policies and programs may be needed to increase the efficiency of an income maintenance scheme. More specifically, programs providing day-care centers, for example, can affect the work incentives of females. Furthermore, it is generally acknowledged that one objective of income assistance programs should be to aid the recipient to become self-sufficient. Programs providing on-the-job training as well as those providing for basic education have recognized the need

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[6]The reader is referred to the concluding section of the previous chapter for the discussion of the demographic groups found to have the larger disincentive effects on work effort due to income and wage rate differences.

for a readily marketable skill. These latter programs should alter somewhat the degree of disincentives associated with the younger age group as well as with the group having lower levels of education by altering the opportunities available to each group.

Additional policy implications arise when it is recognized that many of the demographic characteristics correlated with the greater work disincentives are concentrated geographically. Consider, for example, the ghetto of the central city. It has been recognized for some time that the better job opportunities are departing from the central city whereas ghettoes have tended to concentrate in and around the central city. This is not to say that "job" opportunities are not available to those living in the ghetto. It is interesting to note that although jobs may be available in adequate quantity in central city area, these jobs are usually the least desirable in most respects. Even where meaningful job opportunities exist, this information is not readily available in the ghetto.

Doeringer has pointed out that workers in the ghetto have poor work habits and job instability resulting from fluctuations in product demand.[7] Referral services located in the ghetto which provide referrals to higher paying jobs may upgrade workers, and job experience may change work habits. These two results should alter the work incentives associated with the wage and income effect.

In summary, the interactions of various selected demographic

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[7]Peter B. Doeringer, "Manpower Programs for Ghetto Labor Markets," Programs to Employ the Disadvantaged, ed. Peter B. Doeringer (Englewood Cliffs, N. J., 1969), pp. 254-255. Most of the points related to the ghetto are discussed in this article.

characteristics with the wage and income variables indicate that an income maintenance program designed to combat poverty will lead to differential effects on work incentives among demographic classes within the FAP and WNP-C samples. Note that the policy implications of these findings conflict with the goal of a noncategorical transfer scheme to supplant the various categorical transfer programs. It has been suggested that supplemental programs are desirable from the standpoint of the objectives of an income maintenance program. Supplemental programs can reduce the short-run cost of a subsidy program through their effects on work disincentives associated with the income and substitution effects. But more importantly, cost can be reduced in the long run when the objective to make the subsidized individuals self-sufficient is realized because the number of recipients decline.

It is most certainly not intended that the reader conclude that these supplemental programs should supplant an income maintenance program. These supplementary programs as the name implies are complementary to, not substitutes for, an income maintenance program. The common characteristic among poor families is inadequacy of income, regardless of the number of hours worked.

Work Incentives and Welfare Reform

Many individuals and policy makers have held the notion that those who work more, earn more, and then conclude that low incomes are a result of lack of effort. If, as suggested by the findings of this study, the labor supply curve is negatively sloped, this means that working individuals with low hourly earnings supply more hours, on the average, than do those with higher hourly earnings. It should be noted

that for the FWFH group of the FAP sample the mean value for yearly hours worked is 2285 hours.[8] This implies that, on the average, family heads in this group worked more than full-time in terms of a 40 hour week, even if they worked 52 weeks per year.

Only small disincentive effects associated with either the lump sum or tax features of an income maintenance scheme were found for the FWFH group of the FAP sample. This suggests that the appropriate concern over provisions for welfare reform relating to this group should deal with problems other than the work incentive issue. Regardless of the subsidy scheme adopted, the average number of total hours worked per year for this group will decline somewhat, but probably not below what is normally interpreted as "full-time."

One consideration should be emphasized and is deserving of additional investigation. It would be of interest to know the extent to which the work adjustment of the FWFH group due to a subsidy program would be a result of the termination or adjustment of "moonlighting" hours rather than adjusting hours worked on the more permanent job. This type of information was not available in the SEO data.

In the FWPH group, the income effect is stronger than the net wage effect. A lump sum transfer of say $1000 associated with a positive marginal tax rate of 50 per cent will lead to a reduction in hours worked.[9] As the magnitude of the lump sum increases, so will the

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[8]The mean values for the WNP-C, WP-WC, and WNP-WC samples were 2314, 2441, and 2368 hours respectively.

[9]This conclusion is based on Tables XI and XII. The wage elasticity times 50 per cent times mean hours worked per year gives the wage effect. This is then compared to 1000 times the income coefficient (income effect).

disincentive to supply hours of work. A wage subsidy in this case would have a definite disincentive effect, but of a smaller magnitude than the combination of the lump sum and marginal tax.

A slightly different situation exists for the PWFH and PWPH groups. These samples both have negative income effects associated with the lump sum transfer, but neither have a perceptible net wage effect. The wage effect appears to be composed of off-setting income and substitution terms. The combination lump sum and positive marginal tax plan would result in reduced work effort for these groups. It is interesting to note that a wage subsidy would have negligible effects on work incentives.

If, for good reasons, it is decided to implement the lump sum, positive marginal tax rate type scheme, concern over work incentives for the FAP sample as a whole appears to be justified. To avoid these reductions in hours, work requirements have been suggested by some as a condition for eligibility to receive benefits. If we assume these requirements are set at the "full-time" level, it should be noted that the FWFH group may still possibly reduce total hours worked, but that might be socially justifiable.

A full-time work constraint may mean that many of the part-time working poor simply do not participate in the poverty program. Additionally, individuals who work full-time, either because of choice or because of a work requirement, may have reduced opportunities for investment in human capital (education and training) due to time limitation. Furthermore, poor family heads are not likely to become self-sufficient in terms of an adequate earnings level by staying on a job of the type held by those in the FWFH group. The following

description is enlighting in this regard:

> Most disadvantaged workers can find employment, but they are usually limited to unattractive job opportunities which involve low wages, poor working conditions, employment instability, little chance for advancement, minimal on-the-job learning, and frequently harsh and inequitable supervision. In most of the tight urban labor markets of the late sixties, almost anybody who wanted to work could fine employment on his own and the high unemployment rates in low income areas were largely the result of rapid turnover resulting from the quality of the work available. Jobs were either so unsteady that people were continually thrown out of one job and forced to find another or the jobs were so unattractive that the unemployed often preferred to quit their jobs upon the slightest provocation and to prolong the job search in hope of finding something better. The major failing of national manpower policy over the last seven years has been its failure to define the problem in these terms.[10]

Several proposals temper the work requirement provision by providing the potential income transfer recipient with the alternative opportunity of enrolling in a training program, the purpose of training programs being to upgrade the workers' skills to qualify him to perform higher wage tasks. This assumes that higher wage job opportunities are available for the employment transition once the training period is completed. Also, the extent to which FWFH workers would choose to participate in training programs is not known. These are the very persons who are going to stay on subsidies as long as they continue to work in their present employment, ceteris paribus. "Incentives" for for retraining and relocating these workers are essential to a cost reduction in the income transfer program and to meet the objective of worker self-sufficiency in terms of income adequacy.

In recognizing the limited meaningful employment opportunities

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[10] National Manpower Policy Task Force Associates Proposed Statement on Federal Manpower Policy, a draft of the policy statement issued July, 1970, p. 3.

available to the poor, many suggest making jobs available in the public sector. If these jobs are quality jobs of a permanent nature, this may be a consideration; however, if these jobs are of a temporary nature viewed as mechanisms whereby the poor will have to earn their dole, then the long-term solution to the poverty problem may be impeded. An exception to this would be when public employment could provide training in areas comparable to jobs in the private sector and where employment of the trainee is likely.

The extension in coverage of an income maintenance program to include families other than those in the FAP sample should be considered. Families grouped into the WNP-C sample differed from the families of the FAP sample in that the former had income levels only slightly above the proverty threshold.

The comments made about the FWFH group in the FAP sample concerning work incentives apply to the WNP-C sample. The FWPH and PWFH workers both had work incentive effects such that the negative effect on work effort of a lump sum transfer would dominate the weaker positive effect of a positive marginal tax rate.[11] Statements concerning the incentive effects of the PWPH groups for the FAP sample apply to this same group in the WNP-C sample.

Although comparisons of the work incentive effects for the various groups can be made across the FAP and WNP-C sample, there are some specific considerations to be made about the WNP-C sample. The fact should be recognized that, while the FWPH, PWFH, and PWPH groups are

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[11]The conclusion was based on TABLES XV and XVI and calculated in the same manner as done for the FWPH group of the FAP sample.

above the poverty threshold, they are working only on a part-time basis. The FWFH groups, however, consists of family heads who are working full-time and are at income levels slightly above the poverty threshold. It would seem that some attempt should be made to improve the quality of job opportunities available to the FWFH workers in this sample.

As a matter of conjecture, and a possible area for future study, suppose an income maintenance plan were designed incorporating provisions for job training and meaningful employment in the public sector when quality employment opportunities are not available in the private sector. Eligibility for participation in this program would be limited to families whose income fell below the "poverty" threshold. How would the family heads who were working full-time yet with incomes slightly above the poverty threshold react to the increased long-term employment opportunities available to those eligible to participate in the program? Would they reduce their work effort to take advantage of, not the income transfer, but the increased long-term employment opportunities? This same consideration might also apply to the part-time workers, but probably to a lesser extent, especially if a work requirement exists.

Next, consider the extention of eligibility to include families in the WP-WC and WNP-WC samples for participating in the income maintenance programs. Comparisons of the various work incentive effects for the FWFH group are more difficult in these two samples because much larger wage effects were obtained. Recalling the previous discussion about the separation of the income and substitution effects for this group, it appears that the income effect is a larger negative value for these samples than was the case for the FAP and WNP-C samples. Still, the large negative wage effect may mean that the net disincentive effect

for a lump-sum, positive marginal tax rate scheme may be negligible.

No significant estimates of incentive effects were obtained for the FWPH group of the WP-WC sample. For the WNP-WC sample, this group had a very large negative income effect and no significant total wage effect. For the WP-WC sample, the evidence suggests that the provisions of any subsidy scheme are likely to have few harmful effects on work incentives. For the WNP-WC sample, however, a wage subsidy may have negligible work disincentives, but a combination lump sum and tax scheme will most likely have significant effects on reducing work effort. These same comments for the FWPH group of the WNP-WC sample apply to the PWFH and PWPH groups of that same sample. Either a wage subsidy or a lump sum transfer with a positive marginal tax scheme would lead to a reduction in work effort. The latter scheme would tend to reduce work effort by the greater amount.

In an effort to eliminate poverty, those families in the WP-WC sample should be included in the coverage of any income maintenance program. The evidence shows that work disincentives are, on the average, greater for this sample than for the FAP and WNP-C samples. Still these families are considered "poor" according to the Social Security Administration's poverty criterion. The work efforts may not be affected uniformly among the various demographic characteristics for the different groups of the WP-WC sample although few significant effects were found. Still, including this sample under the provisions of an income maintenance program, even if work requirements were present, would at least partially eliminate poverty among the working poor families and unrelated individuals without children (WP-WC sample).

The results of this study have been presented in this chapter by

making broad comparisons. This procedure is more meaningful for policy implications than relying on a precise estimate of a variable's coefficient or of a calculated elasticity.[12] Even if these estimates were slightly biased, the broad comparisons would be likely to hold.

[12]This fact was made evident in comparing coefficients and estimates across the two income variants of the regressions estimated.

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