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INCOME GUARANTEES AND THE WORKING POOR: THE EFFECT OF INCOME MAINTENANCE PROGRAMS ON THE HOURS OF WORK OF MALE FAMILY HEADS

David H. Greenberg and Marvin Kosters

A Report prepared for

OFFICE OF ECONOMIC OPPORTUNITY

Rand

SANTA MONICA, CA. 90406

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PREFACE

This study was performed under Contract B99-4944 with the Office of Economic Opportunity and is an empirical analysis of the effects of alternative income maintenance programs. The Survey of Economic Opportunity was used to obtain estimates of the labor supply parameters required to assess the implications of these programs for hours of work of male family heads. These estimates were used in a simulation of the costs, the impact on incomes, and the changes in work patterns that might result from the extension to the working poor of income maintenance programs incorporating negative income tax principles.

The authors are indebted to Arthur J. Alexander, Stephen J. Carroll, and Alvin J. Harman of The Rand Corporation for a number of valuable comments and suggestions.

David H. Greenberg is a member of the Rand research staff. Marvin Kosters, formerly with Rand, is a senior staff economist with the Council of Economic Advisers.

SUMMARY

Widespread dissatisfaction with the current welfare system has resulted in numerous proposals for reform, most of which incorporate negative income tax principles. Intelligent reform of the existing system requires information on the cash benefits that participants would receive in alternative programs and on the costs that non-participants would incur. Although estimates of the potential costs and benefits of alternative programs do exist, they are deficient in that they disregard effects on work incentives. This is not through negligence but only because the necessary information on the relationship between wage and income changes and work decisions has not been available. However, if a new program does affect the labor supply (resulting, for example, in a net reduction) and estimates of program outcomes fail to reflect this -- projected increases in money income will be overly optimistic and subsidy costs will be higher than expected. Another important dimension of program impact -- the reduction in economic output associated with the decrease in work effort -- will not be taken into account.

This Report attempts to fill some of these gaps. Estimates of the relationship between wage and income changes and hours of work were obtained from existing data. These estimates then were used in a simulation of the costs, the impact on income, and the changes in work patterns that might result from the extension to the working poor of income maintenance programs incorporating negative income tax principles, such as the Family Assistance Plan proposed by the present Administration. Although the study was limited to male-headed families, and incorporates only the hours of work response of the family heads, it does take into account a major component of adjustments in work patterns and in earnings of the working poor. This group is of particular interest because extension of income supplements to them represents one of the major new departures of proposed programs.

Negative income tax programs incorporate two major dimensions, both of which influence the labor supply. First, they pay a subsidy to

participating families. While the subsidy can be used to purchase more market goods, part of the increase in income resulting from the subsidy may be offset by the purchase of increased leisure. Second, such programs impose a tax rate on earnings, thereby reducing the amount of market goods and services that can be obtained in return for an hour's work, which encourages those who are taxed to reduce their work effort. Empirical analysis of the impact on hours of work of alternative income maintenance programs requires estimates of the labor supply response to both program dimensions.

In this study, estimates of the labor supply response to variations in the family head's wage rate, net of taxes, and in family income were obtained by measuring the differences in annual hours of labor supplied by workers with different wages and different levels of nonemployment income. The analysis is based on the assumption that information on the systematic relation between work choices and differences in wage rates and income levels can be used to infer the response of a typical worker faced with changes in these variables similar to the differences observed. The analysis was based on a national sample of approximately 6,000 households, headed by married males under 62 years old, drawn from the 1967 Survey of Economic Opportunity file. The labor supply response parameters were estimated by regression techniques.

In addition to the wage rate and nonemployment income, a number of other variables were incorporated into the analysis to attempt to control for other differences between workers. The most important and novel of the additional variables is our attempt to control for the influence of different preferences for assets on the observed relationship between non-employment income and work choices. The construction of a variable to control for preference differences is regarded as the major innovation in the study and the evidence indicates that it has enabled us to obtain more reliable labor response estimates than those obtained in earlier studies.

Estimates of the effects of changes in the wage rate and in non-employment income on hours of work varied between different demographic subgroups of the sample, although they showed a tolerable degree of

consistency between major subgroups. They also varied somewhat depending on the precise functional form and construction of variables. On the basis of the evidence and our judgment of the most likely character of biases in the estimates, three sets of supply parameters were used to analyze labor supply responses to alternative income maintenance programs: High and low estimates representing the maximum and minimum response that could be inferred from the overall evidence, and an intermediate set of estimates that we believed represented the most likely response.

The labor supply parameters were used to simulate the impact of several alternative negative income tax programs. From the perspective of immediate policy implications, the most interesting results are for a combined Family Assistance Plan-Food Stamp Program (FAP+FSP), the heart of the Administration's recommended changes to the current welfare system. On the basis of the intermediate set of labor response estimates, it appears that about 2.3 million families headed by males under 62 years of age would participate in FAP+FSP. These families would receive around $4 billion in transfer payments. About one-third of this subsidy would go to residents of the central cities of urban areas with at least a quarter of a million inhabitants, and over another third of the subsidy to rural areas.

More than half would be received by families in the South Census Region. Families headed by whites would receive about 62 percent of the total transfer payments under FAP+FSP, while those headed by Negroes would receive about 36 percent. Rather surprisingly, more than half of the benefits would go to families whose pre-program income exceeded $4000 and more than two-thirds to families with 6 or more persons.

Some of the $4 billion subsidy would, in effect, be used to purchase leisure. Thus, earnings of the family heads, a measure of the market value of the goods and services they produce, would decline by about $1.4 billion. As a result, family income of participating families increases by only $2.6 billion, rather than by the full $4 billion in transfer payments. The heads of these families would reduce their labor supply by about 19 percent. This decline in hours would reduce

the total hours worked by all married male family heads under 62 years of age by somewhat more than 1 percent, while the hours worked by the entire labor force would be reduced by about one-half of 1 percent.

CONTENTS

LIST OF TABLES

Text

I. INTRODUCTION

The adoption of a social innovation is frequently triggered by the conspicuous failure of existing policy. Widespread dissatisfaction with the present welfare system has resulted, for example, in serious legislative consideration of a program incorporating negative income tax principles. Although major departures in social policy may give rise to expectations of significantly improved performance, their actual results are far less certain than those of incremental changes in policy. For instance, the President's proposed Family Assistance Plan, embodying the concept of a negative income tax, has generated a considerable controversy over the program's cost and the extent to which program participants will alter their working patterns. Resolving these issues requires a knowledge of the relationship between wage and income changes and work decisions. Inferences can then be made as to the work incentive effects of alternative income maintenance plans, which determine, in turn, the work patterns of those under the program and the ultimate cost of the program.

Information on the manner in which wage and income changes affect work choices can be obtained only by estimating labor supply functions. Data for such estimates may be provided by specially designed pilot studies or from existing cross-sectional data files in which wage rates and income differ among families. Pilot programs are in many ways superior to inferential studies based on cross-sectional data, but they are expensive and time consuming. Government policy decisions frequently cannot await their completion.[1] The inferential study is a useful supplement to and check on the pilot experiment.

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[1] For example, the following comment appears in a preliminary report on the New Jersey experiment, the best known and earliest of the negative income tax pilot programs: "The relevance of this experiment to the ongoing discussion of Nixon's Family Assistance Plan and welfare reform in general is genuine enough; but because it is still a long way from completion, these results must inevitably be both less comprehensive and less powerful than many people would like them to be, or think they should be." Harold W. Watts, *Adjusted and Extended Preliminary Results from the Urban Graduate Work Incentive Experiment*, Institute for Research on Poverty Discussion Paper, University of Wisconsin, Madison, June 10, 1970, p. 1.

In this study, existing data were used to obtain estimates of the impact of wage and income differences on work decisions. These estimates were then used to make inferences about the costs, the impact on incomes, and the changes in work patterns that might be expected from the extension of alternative income maintenance programs to the "working poor." Extension of income supplements to the working poor is one of the major new departures of proposed programs; and the working poor constitute a significant segment of society. Uncertainty about the impact on this group is, therefore, a major element in the uncertainty about program costs and the focal point of public concern over possible unfavorable effects on work behavior.

Even within the context of estimating program impact on the working poor, however, the analysis is limited in two major ways: (1) We did not consider the degree to which workers might have an incentive to withdraw completely from the work force. (2) Our results pertain only to married male family heads under 62 years of age. In terms of hours worked and earnings, this group is by far the most important to be covered by most proposed programs, but it is certainly not the only significant group. The reasons for these restrictions on the scope of the study are discussed in some detail in Appendix A.

Section II discusses the model. Section III describes measures of the variables that are used in the model. The data and sample are also briefly discussed in this section. A major innovation of this study is the effort to control for the influence of preference differences on the observed relation between income and work choices. The results of this effort are presented in Section IV. Estimates of the effects of changes in the wage rate and in nonemployment income on hours of work are reported in Section V. These estimates are used to take into account the effect on hours of work of negative income tax programs in a simulation of the results of several alternative program designs. The analytic framework for the simulation and the programs considered are discussed in the first two parts of Section VI. The simulation results themselves are presented and discussed in the last part of that section. A brief summary and some concluding observations appear in Section VII.

II. THE MODEL

Many of the factors that must be taken into account in an empirical analysis of the effects of wage rate and income changes on labor supply are best understood in terms of the theory of consumer behavior. Since much of this theory, as it applies to labor supply estimates, is discussed in considerable detail elsewhere,[1] only a brief sketch will be presented in this section. One aspect of the theory that has been virtually ignored in previous empirical work is the way in which observed relationships are affected by differences in preference structures. The role of preference differences is discussed in some detail in this section.

LABOR SUPPLY

Economic analysis of labor supply uses the framework of consumption theory to analyze how an individual divides his time between work and leisure. The theory decomposes supply responses to changes in economic incentives (higher wages, for example) into substitution and income effects.

The hourly wage rate is a measure of the amount of market goods and services that can be obtained in return for an hour's work (in return for giving up an hour of leisure). Since a high wage rate yields more market goods for a unit of leisure forgone, higher wage rates create an incentive to work more and consume less leisure. This tendency to work more in response to higher wage rates because of the

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[1] See, for example, Marvin Kosters, *Income and Substitution Effects in a Family Labor Supply Model*, P-3339, The Rand Corporation, Santa Monica, December 1966; Marvin Kosters, "Effects of an Income Tax on Labor Supply," *The Taxation of Income From Capital*, The Brookings Institution, Washington, D.C., 1969; Jacob Mincer, "Labor Force Participation of Married Women," *Aspects of Labor Economics*, Princeton University Press, Princeton, 1962, pp. 63-105; Glen G. Cain, *Married Women in the Labor Force*, The University of Chicago Press, Chicago, 1966; and William G. Bowen and T. A. Finnegan, "Labor Force Participation and Unemployment," in Arthur M. Ross (ed.), *Employment Policy and the Labor Market*, University of California Press, Berkeley, 1965, pp. 115-161.

more favorable rate at which leisure can be exchanged for market income is called the substitution effect.

At a given amount of work, a higher wage rate also produces a higher income level. Increased income allows the purchase of both more market goods and more leisure, and we normally expect this increased income to be divided in some manner between increased purchases of each. This tendency to work less because the increased income resulting from higher wages allows consumption of both more market goods and more leisure is called the income effect.

The net effect of higher wages on labor supply thus depends on the relative strength of two forces working in opposite directions -- the substitution effect and the income effect. Current market work, however, is not the only source of income because many individuals receive income from nonemployment sources. Equity in the form of housing, pension rights, stocks and bonds, savings accounts, and the like represents the principal source of nonemployment income. Income from these sources, to the extent that it is an assured, steady flow, affects work decisions, but only through the income effect. Income from nonemployment sources, therefore, permits the estimation of an income effect. This income effect estimate can be used to adjust for the income effect associated with wage rate changes to obtain an estimate of the substitution effect.

To illustrate how estimates of these labor supply parameters are obtained, consider the response of a worker initially supplying L units of labor at the wage rate W. A change in the wage rate, dW, causes a change in income of $dY = LdW$. The net effect of the wage rate change is dL/dW, and the component that is a result of the associated change in income is $(dL/dY)(dY/dW)$. The derivative dL/dY represents the effect of a change in income with no change in the wage rate, such as the receipt of an annuity, and L can be substituted for dY/dW. The component of the individual's labor supply response attributable to the income effect, $L(dL/dY)$, must be subtracted from the net effect of the wage rate change to obtain an estimate of the substitution effect. Thus, the expression for the substitution effect or the "income-compensated" effect of the wage rate change is:

$$S = \frac{dL}{dW} - L\left(\frac{dL}{dY}\right) \quad .$$

Or in elasticity form:

$$\varepsilon^{S} = \left(\frac{dL}{dW}\right)\left(\frac{W}{L}\right) - \frac{(WL)}{Y}\left(\frac{dL}{dY}\right)\left(\frac{Y}{L}\right)$$

The two opposing effects of a wage rate change can be estimated from information on the labor supply response of the typical worker to a change in his wage rate, (dL/dW), and his response to changes in income from nonemployment sources, (dL/dY). Obtaining estimates of labor supply response to these two variables is, therefore, the principal concern of the first part of this study.

Labor supply response parameters were estimated by multiple regression techniques in which a measure of labor supply was regressed on measures of the wage rate, nonemployment income, and other variables. The additional variables were used to attempt to hold constant nonrelevant differences (differences between workers other than in incomes or wages). Since cross-sectional data are used, the response of a particular worker to changes in his income or wage rate is not measured directly. Instead, differences in work choices of workers with different wages and levels of nonemployment income are measured. It is assumed that the systematic relation between work choices and differences in income levels and wage rates can be used to infer the response of a typical worker faced with changes in these variables similar to the differences observed.

Applying the framework discussed above to a member of a family unit, instead of to an individual who constitutes an autonomous decisionmaking unit, introduces additional complications; but it does not alter the basic approach. The application of the model to the more complex family situation is discussed later.

THE INFLUENCE OF PREFERENCE DIFFERENCES

The standard labor supply theory described in the previous section predicts that an income-compensated change in the wage rate will have

a positive effect on labor supply, and the change in income accompanying the wage change will have a negative effect. Empirical studies have generally indicated that the income effect tends to outweigh the substitution effect leading to a net negative relation between wages and labor supply. Yet in many studies the income effect implied by estimates based on income from nonemployment sources has been inconsequential or too small to be consistent with the size of the income effect implied by estimates of the effects of wage changes.[1]

The standard theory is developed for a worker with a specified structure of preferences. Dispersion in preference structures is typically ignored in demand studies designed to explore the effects of prices and incomes on quantity demanded of a good, since preference differences can usually reasonably be assumed to be distributed independently of prices and incomes. In the context of labor supply, however, it is more reasonable to expect significant interaction between differences in preferences structures and the work choices and asset accumulation patterns that give rise to observed labor supply and nonemployment income. Neglecting the influence of preference differences may lead to empirical results that fail to conform to the predictions of theory.

In considering the influence of preference differences on work-leisure choices, it is useful to distinguish among three general "goods": leisure, current market goods consumption, and asset accumulation. Current consumption of market goods and asset accumulation, both involving market work, can be chosen as alternatives to leisure. Differences in preference structures among individuals or consumer units can be expected to result in different combinations of these goods chosen with a given set of relative prices. Since dispersion in preferences for current consumption of market goods relative to leisure will not automatically result in any systematic relation between

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[1] See Kosters, "Effect of an Income Tax on Labor Supply"; Malcolm S. Cohen, Samuel A. Rea, Jr. and Robert I. Lerman, *A Micro Model of Labor Supply*, BLS Staff Paper 4, U.S. Department of Labor, Bureau of Labor Statistics, 1970; E. D. Kalachek, and F. Q. Raines, "Labor Supply of Lower Income Workers," *Technical Studies*, The President's Commission on Income Maintenance Programs, Washington, D.C., 1970.

the labor supply and the wage rate or nonemployment income, it can in principle be ignored. Dispersion in preferences for asset accumulation relative to leisure, on the other hand, results in a systematic relation between levels of nonemployment income and work effort that must be taken into account in estimating income effects.

Persons with relatively strong preferences for asset accumulation will tend to work more and consume less leisure than others at a given wage rate. These same persons will also have larger than average asset holdings than persons of a similar age and earning capability and these asset holdings are the principal source of nonemployment income. The income stream from the larger than average asset holdings, taken by itself, will tend to depress labor supply through the income effect. The strong preferences for asset accumulation relative to leisure, on the other hand, would be expected to result in a positive relation between labor supplied and the level of asset holdings and nonemployment income. Thus, if preference differences have an important influence on choices between leisure and asset accumulation, estimates of the impact on labor supply of nonemployment income will be significantly diluted if no attempt is made to control for preference differences. That is, observed work choices will reflect not only the negative impact on labor supply of income from nonemployment sources, but also a preference-induced tendency for high levels of asset holdings to be accompanied by relatively high levels of work effort.

The influence of dispersion in preferences on estimates of the effect on labor supply of nonemployment income is illustrated in Fig. 1. The relations considered there are discussed in terms of cross-sectional observations on a labor supply variable, the wage rate, and nonemployment income. For persons with a given wage rate and no differences in preference structures, the income effect on labor supply of an increment of nonemployment income, ΔY, would be estimated as ΔL. The points P_1 and P_2 represent choices within a given structure of preferences; that is, I_1 and I_2 are members of a single set of indifference curves. The negative relation between labor supply and nonemployment income conforms to theoretical expectations.

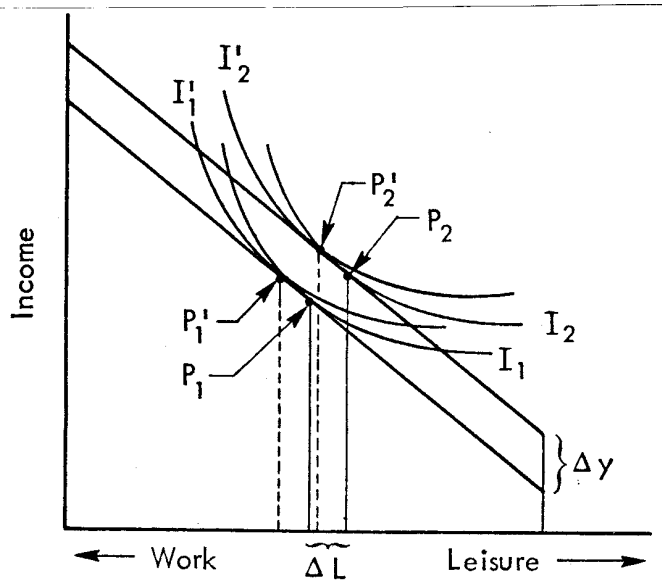

Fig. 1 -- Influence of dispersion on estimates of the effect of nonemployment income on labor supply

If preference differences have little influence on work choices and asset accumulation patterns, observations on labor supply for two individuals with differing amounts of nonemployment income and similar wage rates can be expected to conform to the pattern indicated by points P_1 and P_2. But if preference structures do differ among individuals and influence work choices and asset accumulation, the presence of a greater than average amount of income from nonemployment sources may be a consequence of a relatively strong preference for asset accumulation. The family of indifference curves representing the preference structure of the greater than average asset accumulator would be represented by indifference curves such as I'_1 and I'_2, and P_2' would represent his work choice. In this case, the observed labor supply choices of two individuals will reflect preference differences as well as income differences, and these observations would be represented by such points as P_1 and P'_2.

If preference differences are ignored, the estimated income effect would be weaker than the actual income effect within a single given

structure of preferences as illustrated in Fig. 1. Significant interaction among preference differences and work choices and asset accumulation will result in a systematic tendency toward underestimation of the income effect. Indeed, a sufficiently strong relation between preference differences and work choices motivated by differences in desired asset accumulation could lead to positive estimates of the effect on labor supply of the nonemployment income stream from asset holdings.

In econometric terms the assumption that preference differences are distributed independently with respect to asset holdings results in correlation between the residual and one of the independent variables -- nonemployment income -- if no variable to control for preference differences is included. A variable controlling for preference differences would capture any systematic tendency for higher levels of asset accumulation to be accompanied by more work effort. A preference control variable would, therefore, be expected to have a positive sign, and its inclusion would be expected to lead to a more pronounced negative relation between labor supply and nonemployment income. The construction of such a variable and evidence of its influence on income effect estimates are discussed in Sections III and IV.[1]

LABOR SUPPLY IN A FAMILY CONTEXT

The labor supply model outlined above is, strictly speaking, only applicable to individuals. Extending the model to a family situation raises several questions: Who makes the labor supply decisions? What wage and income variables are relevant to the decisions? How are the principal alternatives affected by differing family sizes and structures?

With respect to the first question, the family is regarded as the appropriate unit of analysis, and, correspondingly, labor supply decisions are regarded as family decisions.[2] The family is assumed to

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[1] A statistical discussion of the role of preference differences and the preference measure we use is presented in Appendix D.

[2] Mincer, "Labor Force Participation of Married Women;" Kosters, Cain, *Married Women in the Labor Force*.

reach these decisions by choosing on the basis of the total resources or potential income of the family and the structure of wage rates or earning capabilities within the family. The labor supply choice for each family member will, therefore, depend not only on his own wage rate, but also on that of other family members and on the total resources available to the family. The income of the family from market work reflects the outcome of choices that are made in an effort to secure a maximum level of family welfare.

The variables relevant to the labor supply choices of a family member are those that can be regarded as exogenous -- that is, not themselves a result of choices of another family member. The principal economic variables that can be regarded as exogenous for cross-sectional analysis are nonemployment income and the set of wage rates.[1] The data, unfortunately, do not provide us with a complete set of wage rates for all observations, which would be necessary if each family member's labor supply were treated strictly as a reduced form equation. Many family members, for example, are potential rather than actual earners, and wage rates, of course, are not available for such individuals. We have found no completely satisfactory way to handle this problem, but we have used two approaches to examine the sensitivity of our estimates. As one alternative, the earnings of the spouse and of other family members are used as independent variables. As a second alternative, separate regressions are computed for a subgroup of families in which the only earner is the head of the family.

Variation in family size may lead to differences in market income needs thus affecting work decisions. Moreover, the presence of children can substantially influence nonmarket or home work, which is treated as a component of "leisure" in our analysis. The effects of variations in family size and structure on the character of alternatives relevant in labor supply choices are likely to have their more important influence on choices for the wife instead of the male head, because variation in

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[1] Over time, of course, nonemployment income levels are in part a result of past choices, but this is also true with respect to wage rates.

nonmarket work will usually be a secondary consideration for him. Differences in family size influence market income needs, on the other hand, and we attempt to control for these differences.

CONTROLLING FOR DEMOGRAPHIC AND OTHER DIFFERENCES

We included several additional control variables in the regressions in an attempt to remove the influence of demographic, regional, and other differences on the estimates of labor supply parameters. The large sample that was analyzed also made it possible for us to consider a broad range of subcategories and allow complete interaction among the variables by computing separate regressions.

The main concern of this study is to obtain estimates of wage rate and income effects. Hence, demographic and other control variables are analyzed because of their possible influence on these estimates, rather than for their own direct impact on the labor supply. Simply including a selection of control variables without allowing interactions with wage rate and income variables allows for differences in the intercept attributable to these variables, but it does not permit estimates of how they influence labor supply responses to wage and income changes. Computing regressions separately for subgroups, on the other hand, allows for a differential impact on labor supply for each variable included.

Among the factors explicitly excluded from the regressions are occupation and industry. These variables have been included in some studies in an attempt to account both for demand and supply differences and for institutional constraints on normal working hours.[1] They were excluded from this analysis because shifts between occupations and industries are regarded as one of the avenues workers use to satisfy their hours preferences. This approach to the estimation of labor supply response parameters implicitly assumes that workers are in general able to find employment situations consistent with their hours preferences, and that differences in demand have no important systematic influence on their hours choices.

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[1] See, for example, Kalachek and Raines, "Labor Supply of Lower Income Workers."

III. THE VARIABLES AND THE DATA

The variables of primary interest in this study are the labor supply measure, the wage rate, nonemployment income, and a measure of preference differences. We shall briefly present measures of these and other variables. A short discussion of our data and our sample is also included.[1]

THE DATA

The analysis is based on a sample drawn from the 1967 Survey of Economic Opportunity file. It included households headed by married men less than 62 years old in families whose incomes did not exceed $15,000 in 1966. The ways in which it was necessary to restrict this basic sample, such as excluding units in which the head had no work experience in the preceding year, are discussed in detail in Appendix A. The restricted sample consisted of approximately 6,000 observations. In addition, the data were divided into a number of subcategories to explore the degree to which labor supply reactions differed among groups.

THE WAGE RATE

The Survey of Economic Opportunity data have some features that make them distinctly superior to most other available data for analyzing labor supply behavior. A measure of the hourly wage rate can be obtained in a relatively direct manner because both earnings and hours worked during the week preceding the interview are reported. Although the measure refers only to a single week, the wage rate is less likely to be affected by abnormal hours than when earnings data are available for only the preceding year, as in the case of data from the regular Current Population Survey or the decennial census.

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[1] A detailed description of the data, the sample, and the construction of the variables is presented in Appendix A.

MEASURING NONEMPLOYMENT INCOME

The Survey of Economic Opportunity contains much more detailed information on sources of nonemployment income and wealth position than is typically available. It is, therefore, possible to identify nonemployment income by source in order to analyze differential responses and to exclude from consideration observations in which nonemployment income is strongly conditioned by labor supplied. The detailed information on asset holdings allows imputation of nonemployment income to these assets and permits the construction of a variable to measure preference differences. In addition, it is likely that eliciting information at this level of detail has reduced misreporting and underreporting of nonemployment income.

Variation in income that does not result simply from differences in the wage rate is necessary to estimate the effect of income on labor supply. Income from nonemployment sources generates differences in income that do not simultaneously involve differences in the rate at which leisure can be translated into income. The measure of nonemployment income that is conceptually appropriate for estimating income effects comparable to those accompanying wage rate differences is the income flow that could be sustained over a family head's expected working life from the conversion of the family's assets and nonemployment income payments into such an annuity. This conceptually appropriate measure can only be approximated from the available data.

The data available to construct a measure of nonemployment income includes income payments received in the preceding year from various nonlabor sources and information on the asset position of the family. These data are likely to be subject to considerable measurement error. And, perhaps more important, they may be so strongly influenced by transitory factors that they depart significantly from the conceptually appropriate annuity concept.

Two measures of nonemployment income were constructed on the basis of information on nonemployment income payments and the asset position of the family. The first measure treats income and assets on an accrual

basis. That is, income is imputed to all important assets -- based on the present value of equity in the assets -- and added to nonemployment income from other sources. This measure of accrued nonemployment income (Y^a) regards a dollar of imputed income from assets as equivalent to a dollar of current income payments from nonemployment sources.

In the second measure of nonemployment income, income flows are emphasized instead of accrued nonemployment income. The difference in the two approaches is most easily illustrated by an example. Consider the situation of a family that owns its home. Its income from that source on an accrual basis would be calculated by simply imputing a return to equity in the home. In terms of income flows, however, the homebuyer is committed, as a first approximation, to payments that are equal to those of the renter of a similar dwelling, less an imputed return on his down payment. That is, while the renter's payments are based on the full value of the home, the owner's payments depend on what he still owes after his initial down payment. Both, however, receive a return from their place of residence that is equal to its rental value. Thus, until the homeowner's mortgage is paid off, his income flow can be regarded as only differing from that of the renter by the imputed return on his down payment. Once the home is completely paid for, the owner receives the full rental value imputed to the home.

By applying such reasoning to the home and to other assets, we constructed a measure of imputed nonearned income based on a flow rather than accrual concept. Construction of the flow version of the nonearned income variable (Y^f) was completed by adding imputed income to actual nonemployment income receipts, such as interest payments.

One reason for considering the flow measure of nonemployment income as an interesting alternative to the accrual measure is that the effect of income on labor supply behavior is often viewed as a reflection of current income needs relative to the income available to sustain those needs. The flow measure of income from nonemployment sources may be more appropriate for measuring additional income available to meet current needs. A second reason is that the future is always imperfectly perceived and future income correspondingly uncertain.

Income prospects for the more distant future may be so heavily discounted that current income flow information more adequately reflects perceptions about nonemployment income than a measure of accrued income. The underlying economic reason for distinguishing between income flows and accruals is that the capital market transactions necessary to transform accrued income into a smooth flow of current income may be sufficiently expensive to effectively preclude such activity when a large number of relatively small transactions would be required.

EARNINGS OF SECONDARY WORKERS

As noted earlier, since a complete set of wage rates for all family members is not available, the annual earnings of the spouse and of family members other than the husband or spouse were utilized as independent variables. These two variables depend on both the hours worked and the wage rates of family members other than the head. As such, the variables carry at least three effects: an income effect, a cross-substitution effect, and a taste effect. The first two effects should be negatively related to the head's work effort, and the third should be positively related. The income effect produced by the earnings of others is completely analogous to that produced by nonemployment income. Some of the earnings of others can be used to purchase leisure for the husband himself. The amount of leisure taken by the husband is also positively related to the wage rates of others. The higher these wage rates are relative to his, the greater the extent to which the labor of others in the family is likely to be substituted for his. The number of hours worked by secondary family workers is also indicative of a family's taste for income relative to leisure. And the stronger this taste, the greater is likely to be the family head's work effort, as well as the work effort of secondary family workers.

OTHER CONTROL VARIABLES

The following demographic control variables were included in the labor supply regressions.

Age

It is conventionally assumed that younger and older workers have a greater preference for leisure than prime age workers, and that they fare more poorly in the labor market. Thus, a quadratic of age (age and age squared) is used in the regressions.

Education

The variable years of school completed is entered in the regressions linearly. The longer a person remains in school, the greater is his incentive to recoup his investment by working additional hours.

Race

Whites and nonwhites are distinguished by a dummy variable. Nonwhites were assigned a one and whites a zero.

Health

Interviewees were asked whether their health affected their work. Persons who indicated that it did were assigned a one and all others a zero. Presumably, persons with poor health work fewer hours than healthy persons.

Dependents

This variable is the number of persons in the family, excluding the head and his spouse. The husband's incentive to work should increase with the number of his dependents.

THE LABOR SUPPLY MEASURE

Since we are interested in a worker's potential response to changes in his income and wage rate, the number of hours he would like to work during a year, rather than the hours he actually did work, appears to be the most appropriate measure of his labor supply. The measure of potential work effort that we use is the product of the number of weeks

working or looking for work in 1966, and the number of hours worked during the week preceding the survey interview.[1]

MEASURING PREFERENCE DIFFERENCES

Differences in preference structures cannot be observed directly; they can only be inferred from the choices made by consumer units. One way of constructing a variable to represent differences in preferences for asset accumulation would be simply to use a measure of wealth position. If a wealth position variable were included in a regression along with a nonemployment income variable, however, the two variables would differ only by a multiplicative constant aside from dispersion reflecting differences in asset holding patterns and some components of nonemployment income that are not strictly dependent on asset holdings as normally measured. More important, perhaps, such an approach would disregard the distinction between differences in wealth position attributable to factors such as age and the wage rate and differences attributable to dispersion in preference structures.

A variable designed to measure relative preferences should not only take into account how large an individual's asset holdings are relative to those of an "average" person with the same age and wage rate, it should also be designed to reflect the economic significance, relative to his earning capability, of a discrepancy between his actual asset holdings and the typical holdings of an otherwise similar individual.

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[1] We experimented with an alternative measure of the potential labor supply that attempted to adjust for the fact that some persons work more or fewer hours than they would like. Involuntary part-time workers were assigned a value of 40 hours. Similarly, those who were working more than 24 hours, but who expressed a preference for part-time work, were assigned a value of 24 hours. The resulting measure of weekly hours was multiplied by the number of weeks in the labor force. Regressions that used actual hours of work, i.e., actual hours times actual weeks, as the dependent variable were also run. Since the simple correlations between these two measures and the measure we ultimately adopted are over .97, the choice of one of these variables has little influence on our results. The reported measure, however, seems more appropriate than actual hours and less subject to conjecture than the alternative measure of potential annual hours.

Our measure of relative preferences was developed on the basis of these two principles. The variable we have constructed to measure relative preferences for asset accumulation is a measure of the difference between an individual's actual asset holdings ratio and the typical ratio prevailing for a household headed by a male with a similar age and wage rate. Typical or expected asset holdings were estimated from a regression on the wage rate,[1] the wage rate squared, and age -- variables normally regarded as exogenous in the context of the traditional labor supply model. The residual from such a regression was then divided by the present value of full time earnings plus predicted asset holdings. The measure can also be interpreted as the difference between the fraction of income from full time work and normal asset holdings that an individual actually receives in a given year from nonemployment sources and the fraction that an individual with that age and wage rate would normally be expected to receive.

Actual wealth position depends on factors other than accumulation through past work effort, of course, such as inheritance and fortuitous investment choices. Current measures of assets are also highly imperfect measures of desired wealth because they are likely to reflect transitory factors such as short term saving or dissaving for major purchases. Thus, the relative asset preference measure we have constructed can at best be no more than a crude control variable for the variation in hours that is systematically related to nonemployment income, but attributable to differences in preferences for asset accumulation.

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[1]The dependent variable used in these regressions is family net worth, the difference between assets and liabilities. It would in principle be preferable to limit our measure to those components of net worth that reflect only the past work efforts of family heads.

IV. THE INFLUENCE OF PREFERENCE DIFFERENCES: EMPIRICAL EVIDENCE

The major innovation in this study, as compared with previous empirical analyses of labor supply, is the attempt to control for differences in preference structures. The analysis of the role of preference differences enables a reappraisal of the findings of earlier studies in which preference differences were ignored, and it results in more reliable estimates of the impact of wage and income changes on labor supply.

ESTIMATING THE PREFERENCES VARIABLE

To construct a measure of relative preferences for asset accumulation we first obtained predicted values for the levels of asset holdings expected for typical families by regressing the net value of the family's assets on the age of the family head, his wage rate, and his wage rate squared. These variables were chosen because asset holdings are strongly related to them, and they are normally regarded as exogenous in a model of labor supply. The variance of the estimate could no doubt be substantially reduced if we included a selection of other variables such as number of dependents, or whether the family is renting or buying a home. Variables of this sort, however, are jointly determined along with other variables, such as those reflecting work choices. Including such jointly determined variables in a regression to predict asset holdings would give rise to the danger that any influence of the preference measure in a labor supply regression would be a result of systematic relations among a set of jointly determined variables. That is, predicted asset holdings should be free of any differences in preference structures that affect asset holding, so that the measure of relative preferences is permitted to reflect these differences in preference structures.

The regressions estimated to construct the preference variable are presented in Table 1 for selected demographic groups. The presentation of the empirical results in the text will focus upon these six demographic groups, although comparisons with results reported in Appendix B for other groups will be made in the section appraising the overall evidence.

Table 1

ESTIMATED COEFFICIENTS OF REGRESSION EQUATIONS TO PREDICT THE VALUE OF ASSET HOLDINGS ACCUMULATED BY HOUSEHOLDS[a]

Demographic Group[b]	Age Coefficient (A_h)	Wage Rate Coefficient (W_h)	Wage Rate Squared (W^2_h)	Intercept	R^2
1. Basic male family head sample	322.41 (13.26)	3186.6 (147.43)	-74.828 (6.17)	-13558	.14
2. Self-weighting male family head sample	399.81 (19.84)	2886.4 (193.37)	-65.364 (7.13)	-14696	.14
3. Households with only two adults	340.17 (17.67)	2730.0 (167.27)	-64.684 (6.47)	-12846	.12
4. Households with husband as sole earner	344.22 (25.19)	3026.1 (221.06)	-65.601 (7.14)	-13911	.15
5. Households with children	273.19 (17.67)	2783.3 (147.39)	-63.284 (5.64)	-11018	.12
6. Households with able-bodied civilian male head	329.26 (15.48)	3188.7 (153.02)	-74.612 (6.30)	-13700	.14

Notes:

[a]Standard errors are in parentheses below coefficients. All of the coefficients exceed their standard errors by more than a factor of 9.

[b]Demographic group descriptions:

Row 1. Sample of male family heads (see Appendix A for details on how the SEO sample was restricted for the regression sample), excluding those who were not working at their usual job in the week preceding the survey (6,044 observations).

Row 2. The portion of the basic male family head sample from the SEO file that is based on the CPS sample frame (3,953 observations).

Row 3. Interview units in the basic sample in which only the husband and his spouse were 18 years old and over. The household may also include children or relatives less than 18 years old (4,658 observations).

Row 4. Interview units in the basic sample in which the only member with earned income in 1966 was the husband (2,129 observations).

Row 5. Interview units from the basic sample with children or relatives less than 18 years old present (4,409 observations).

Row 6. Interview units from the basic sample excluding those in which the husband was in an institution, in the Armed Forces, or unable to work (ill or disabled) during part of the year in 1966 (5,751 observations).

The value of asset holdings is significantly affected by age and earning capability of the family head. The predicted value increases by nearly $3,000 for every $1 increase in the hourly wage rate at relatively low wages, and it increases at a decreasing rate. Predicted assets also increase by roughly $350 for each additional year of age of the family head. The coefficient estimates show considerable similarity between demographic groups, partly because there is a great deal of overlap between the samples.

Some curvilinearity of asset holdings with respect to age might be expected as well as interaction between age and the wage rate. Experiments to explore these possibilities showed that little increase in the explanatory power of the regression could be achieved in this way, and consequently the relatively simpler formulation was retained. The fraction of variance explained by the regressions is quite low. In addition to differences in preferences for asset accumulation, the remaining variance presumably reflects factors such as the element of chance in savings and investment decisions and differences in exogenous factors that could not be taken into account, such as inheritance.

The second step in constructing the preference variable was to divide the residual -- the difference between actual and predicted asset value -- by a measure of the normal or expected wealth of the family. The husband's earning capability is normally the main component of human wealth, although in a more complete and exhaustive analysis of family labor supply the wife's wage rate and the probability that she will be a labor force participant should also be taken into account. Since we have not developed estimates of earning capability for persons not in the labor force and our analysis is concentrated only on the labor force behavior of the husband, we have neglected the element of human wealth represented by wives and other family members. This simplification can also be justified to some degree by the difficulty in assessing the potential home work contribution of the wife to the family's human wealth and the fact that the value of this contribution depends in part on such variables as the presence of children, which cannot be regarded as completely exogenous.

The value of the husband's earning capability was estimated by capitalizing the husband's full-time annual earnings (40 hours per week for 50 weeks at his reported wage rate) using a 10 percent discount factor. The residual was divided by this value plus the predicted value of asset holdings ($\hat{M}_f$). The construction of the preference variable, P, can be concisely stated as follows:

$$M_{fij} = a_i + b_i A_{hj} + c_i W_{hj} + d_i W_{hj}^2$$

$$P_{hij} = \frac{M_{fij} - \hat{M}_{fij}}{\hat{M}_{fij} + (40 \cdot 50 \cdot W_{hj})/.1} ,$$

where the subscript i refers to a demographic group and the subscript j refers to the household.

INFLUENCE OF THE PREFERENCES VARIABLE

The influence on estimates of the income effect of differences in preferences for asset accumulation, as measured by the relative preference variable we have constructed, is illustrated by the labor supply regression results reported in Tables 2 and 3. These relatively simple regressions included no additional control variables, but the relative preferences variable remains highly significant when a selection of control variables is included.

The role of the preferences variable is consistent with that expected of a direct measure of relative preferences for asset accumulation. The sign of its coefficient is positive, it appears to be highly significant, and its inclusion has a pronounced effect in the expected direction on the income coefficient. For the variant of non-employment income based on accruals, inclusion of the preferences measure leads in each case to a change in the sign of the coefficient from positive to negative. For the flow variant, the sign is switched from positive to negative in four cases by inclusion of the preference variable, and the coefficient becomes more negative in the remaining

Table 2

ESTIMATED WAGE RATE AND INCOME COEFFICIENTS FOR ACCRUED NONEMPLOYMENT INCOME WITH AND WITHOUT CONTROLLING FOR RELATIVE PREFERENCES FOR ASSET ACCUMULATION[a]

Demographic Group[b]	Wage Rate Coefficient (W)	Income Coefficient (Y^a)	Preference Variable Coefficient (P)	Intercept	R^2
1. Basic male family head sample	-78.55	.0334		2384	.049
	(4.45)[c]	(.006)			
	-67.93	-.0397	561.1	2405	.067
	(4.52)	(.009)	(52.08)		
2. Self-weighting male family head sample	-88.07	.0170		2480	.068
	(5.19)	(.007)			
	-79.18	-.0588	638.5	2516	.087
	(5.23)	(.011)	(69.74)		
3. Households with only two adults	-81.99	.0357		2411	.057
	(4.94)	(.007)			
	-71.82	-.0622	734.8	2446	.079
	(4.97)	(.011)	(68.41)		
4. Households with husband the sole earner	-72.49	.0180		2427	.060
	(6.22)	(.010)*[d]			
	-63.21	-.0687	820.2	2464	.091
	(6.22)	(.014)	(97.44)		
5. Households with children	-83.06	.0481		2416	.058
	(5.09	(.008)			
	-72.29	-.0539	775.7	2451	.080
	(5.15)	(.013)	(76.66)		
6. Households with able bodied civilian male head	-80.52	.035		2415	.056
	(4.39)	(.006)			
	-71.36	-.028	482.08	2434	.070
	(4.46)	(.009)	(51.51)		

Notes:

[a] The dependent variable is potential hours of work.

[b] Demographic groups are described in notes to Table 1.

[c] Standard errors are in parentheses below coefficients.

[d] An asterisk denotes case in which the coefficient is less than twice the size of the standard error.

Table 3

ESTIMATED WAGE RATE AND INCOME COEFFICIENTS FOR NONEMPLOYMENT INCOME FLOWS WITH AND WITHOUT CONTROLLING FOR RELATIVE PREFERENCES FOR ASSET ACCUMULATION[a]

Demographic Group[b]	Wage Rate Coefficient (W)	Income Coefficient (Y^f)	Preference Variable Coefficient (P)	Intercept	R^2
1. Basic male family head sample	-74.19	.0127		2390	.045
	(4.41)[c]	(.009)			
	-70.53	-.0499	480.1	2404	.068
	(4.37)	(.010)	(39.31)		
2. Self-weighting male family head sample	-85.58	-.048		2488	.067
	(5.15)	(.010)			
	-83.22	-.0603	474.8	2508	.086
	(5.10)	(.012)	(51.22)		
3. Households with only two adults	-78.11	.0106		2419	.052
	(4.91)	(.011)*[d]			
	-75.59	-.0649	566.3	2439	.079
	(4.85)	(.013)	(48.29)		
4. Households with husband the sole earner	-69.86	-.0094		2436	.059
	(6.16)	(.016)*			
	-67.64	-.0687	598.4	2455	.087
	(6.08)	(.018)	(74.01)		
5. Households with children	-78.49	.0308		2423	.052
	(5.07)	(.014)			
	-76.23	-.0436	586.6	2443	.078
	(5.00)	(.016)	(52.67)		
6. Households with able bodied civilian male head	-76.65	.022		2420	.051
	(4.35)	(.009)			
	-73.33	-.034	419.7	2432	.070
	(4.32	(.010)	(38.70)		

Notes:

[a] The dependent variable is potential hours of work.

[b] Demographic groups are described in notes to Table 1.

[c] Standard errors are in parentheses below coefficients.

[d] Asterisk denotes case in which the coefficient is less than twice the size of the standard error.

two cases. The standard errors of the nonemployment income coefficients are reasonably low after inclusion of the preferences variable, and the coefficients and their standard errors display considerably more consistency across demographic groups and between variants of nonemployment income than they did before its inclusion.

These results suggest that dispersion in preferences for asset accumulation has a marked effect on estimates of the income effect obtained from regressions utilizing disaggregated data. The marked influence of the preference control variable raises serious questions concerning the reliability of income effect estimates developed from disaggregated data in earlier studies in which dispersion in preferences was not considered.[1] One recent study, however, used certain aggregation procedures that may substantially reduce the importance of controlling for preference differences.[2] The role of dispersion in preferences also provides a resolution of the paradoxical results that often appeared in earlier studies of the behavior of hours of work of adult males.[3] Failure to consider preference differences and their interaction with nonemployment income streams may have led to serious positive bias in income effect estimates with the result that these estimates were too small to be consistent with the income effect of wage rate changes and thus not consistent with the standard theory.

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[1] See Kosters, "Effect of an Income Tax on Labor Supply"; Cohen *et al.*, *A Micro Model of Labor Supply;* and Kalachek and Raines, "Labor Supply of Lower Income Workers."

[2] R. E. Hall, "Wages, Income and Hours of Work in the U.S. Labor Force," August 1970, unpublished manuscript.

[3] Some of the results from previous studies implied negative substitution effects.

V. LABOR SUPPLY PARAMETERS: THE EMPIRICAL RESULTS

Analysis of the impact on labor supply of alternative income maintenance programs requires estimates of two basic labor supply parameters. First, an estimate is required of the substitution effect, the labor supply response to changes in the rate at which leisure can be substituted for market income, to analyze the impact of changes in the implicit tax rate at a given level of income. Second, an estimate is needed of the income effect, the labor supply response to changes in nonemployment income, to analyze the impact of changes in the level at which income maintenance payments are set.

Estimates of the effects of the wage rate and nonemployment income on hours of work are presented and discussed in this section. The resulting estimates of wage rate elasticities, income-compensated wage rate elasticities, and income effects are presented and appraised in terms of their implications for the labor supply responses applicable to low income workers.

LINEAR ESTIMATES OF LABOR SUPPLY PARAMETERS

Estimates of wage rate and income coefficients are presented in Tables 4 and 5 for regressions allowing for only linear wage rate and income effects on hours of work. These regressions include the full set of control variables. Inclusion of control variables results in a larger fraction of variance explained and in larger wage rate and income coefficient estimates. The signs of all variables are in the expected direction.

The fraction of total variance explained is relatively low, but this is not unexpected for regressions using disaggregated cross-sectional data. Hours of work of individuals cannot be predicted with any accuracy with the variables we were able to include in the regressions, but the results are not intended for this purpose. Instead they are intended to predict the average performance of groups on the basis of an analysis of the results of individual choices. For this objective, the primary issue is not whether individual choices are accurately predicted, but

Table 4

ESTIMATED WAGE RATE AND INCOME COEFFICIENTS FOR ACCRUED NONEMPLOYMENT INCOME WITH CONTROL VARIABLES FOR RELATIVE PREFERENCES AND FOR OTHER ECONOMIC AND DEMOGRAPHIC FACTORS[a]

Demographic Group	Wage Rate Coefficient (W_h)	Income Coefficient (Y_f^a)	Preference Variable Coefficient (P)	Intercept	Number of Additional Control Variables[b]	R^2
1. Basic male family head sample	-103.20 (4.77)[c]	-.0694 (.010)	555.4 (56.7)	1638	8	.134
2. Self-weighting male family head sample	-105.53 (5.50)	-.0963 (.013)	754.8 (79.3)	1590	8	.144
3. Households with only two adults	-102.09 (5.20)	-.1122 (.013)	843.9 (77.1)	1542	8	.146
4. Households with husband the sole earner	-87.18 (6.49)	-.0988 (.017)	794.6 (107.9)	1601	6	.144
5. Households with children	-110.07 (5.40)	-.0910 (.014)	744.4 (81.5)	1653	8	.153
6. Households with able-bodied civilian male head	-104.61 (4.72)	-.0545 (.010)	468.0 (56.5)	1742	8	.132

Notes:

[a]The dependent variable is potential hours of work.

[b]Each of the regressions included the same set of additional control variables, except for No. 4 where the first two variables listed below were not applicable. The coefficients of the control variables are presented with the full regressions in Appendix B, Table B-3. A list of these control variables and their signs follows: Earnings of the spouse (-), Earnings of other family members (-), Age of head (+), Age squared (-), Number of dependents (+), Grade of School completed (+), Health variable (-), and Nonwhite dummy (-).

[c]Standard errors are in parentheses below coefficients. All of the coefficients exceed their standard errors by more than a factor of 2.

Table 5

ESTIMATED WAGE RATE AND INCOME COEFFICIENTS FOR NONEMPLOYMENT INCOME FLOWS WITH CONTROL VARIABLES FOR RELATIVE PREFERENCES AND FOR OTHER ECONOMIC AND DEMOGRAPHIC FACTORS[a]

Demographic Group	Wage Rate Coefficient (W_h)	Income Coefficient (Yf_f)	Preference Variable Coefficient (P)	Intercept	Number of Additional Control Variables[b]	R^2
1. Basic male family head sample	-108.35 (4.63)[c]	-.0675 (.011)	374.4 (39.7)	1712	8	.133
2. Self-weighting male family head sample	-112.45 (5.38)	-.0708 (.012)	417.1 (52.2)	1700	8	.139
3. Households with only two adults	-109.18 (5.09)	-.0859 (.013)	471.2 (48.8)	1662	8	.141
4. Households with husband as sole earner	-93.26 (6.36)	-.0892 (.019)	450.0 (75.6)	1714	6	.139
5. Households with children	-116.0 (5.27)	-.0787 (.016)	427.2 (52.4)	1733	8	.150
6. Households with able-bodied civilian male head	-108.76 (4.59)	-.0493 (.011)	318.1 (39.2)	1803	8	.131

Notes:

[a]The dependent variable is potential hours of work.

[b]Each of the regressions included the same set of additional control variables, except for No. 4 in which two were inapplicable. The same pattern of signs occurred in these regressions as in those reported in Table 4, note b.

[c]Standard errors are in parentheses below coefficients. All of the coefficients exceed their standard errors by more than a factor of 2.

whether the statistical evidence indicates significant underlying behavioral relationships. The existence of a systematic relationship between hours of work and the variables of primary interest is strongly supported by the usual statistical criteria.

The coefficients of the control variables included in the regression are presented in Appendix B. Some comment on the variables selected for inclusion and their impact on hours of work may be useful, however. Only a limited selection of control variables was included for two reasons: The relatively large sample allowed extensive experiments with subgroups permitting complete interaction among the variables, and limiting the selection of control variables reduces the danger of biases arising from simultaneity when the control variables cannot be regarded as exogenous.

Some of the variables among those selected for inclusion cannot, of course, be legitimately regarded as exogenous. Earnings of the spouse and earnings of other family members are the main variables for which this is true, although the number of dependents can also in principle be regarded as jointly determined. The two earnings measures can be expected to be positively correlated with the wage rate variables that should in principle be used. Since they also reflect variation in labor supply, however, their inclusion may be a source of bias.[1] The possible biases resulting from their inclusion are investigated by separate regressions (such as regressions 3 and 4, which suggest that their impact is probably small), but regression results for these subclasses may themselves be affected by a sample selection bias.

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[1]The estimated coefficients of the two earnings measures were substantially smaller than the nonemployment income coefficients. If these coefficients are interpreted as simply reflecting a cross-substitution effect and an income effect, they imply a less pronounced income effect than do the nonemployment income coefficients. The analysis of the influence of preference differences, however, has not been fully integrated into the family labor supply model. If preference differences for the family have an important influence on labor supply behavior of other family members, as would be expected, the small size of the coefficient estimates may simply be a reflection of this influence.

The labor supply response coefficients in Tables 4 and 5 yield the elasticity estimates reported in Table 6. The wage rate elasticity estimates range from -.13 to -.16. They are similar in magnitude to those estimated in other cross-sectional studies though somewhat smaller than estimates from time series studies. This may be in part a result of constraints on hours that result from work schedules required for smooth operations in the production process. Over time, normal production schedules should be relatively free of such constraints.

The compensated wage rate elasticity estimates are all positive and thus consistent with the theory. They range in size from .02 to .2 based on accrued nonemployment income coefficients, and from zero to .15 for nonemployment income flows. Regressions 1 and 6 show a tendency for smaller income effects and correspondingly smaller substitution effect estimates.

MEASURES OF NONEMPLOYMENT INCOME

The estimates of labor supply response that have been presented are based on two variants of nonemployment income -- a measure of accrued income from nonemployment sources and a measure of income flows from nonemployment sources. Each of these variables is built up by aggregating income from disparate sources. Estimates of the differential impact of some of the major components of nonemployment income are presented in Tables 7 and 8.

The coefficients reported in the first column are estimates of the impact of the components of nonemployment income not separately analyzed. These components are major durable goods -- housing, property, and automobiles. Coefficients in the remaining columns are estimates of the extent to which the impact on labor supply of these components differs from the coefficient estimate in the first column. The negative income stream represented by consumer debt is entered in the regressions as negative nonemployment income, and the estimates show a significantly stronger negative impact for this component than for the durables component. This is also the case for transfer payments. On the other

Table 6

ESTIMATED WAGE RATE ELASTICITIES, INCOME COEFFICIENTS AND SUBSTITUTION ELASTICITIES BASED ON A LINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE[a]

Demographic Group	Wage Rate Elasticity ε^w	Income Coefficient C^y	Substitution Elasticity[b] ε^s
Accrued Nonemployment Income			
1. Basic male family head sample	-.141	-.069	.065
2. Self-weighting male family head sample	-.154	-.096	.156
3. Households with only two adults	-.141	-.112	.197
4. Households with husband as sole earner	-.129	-.099	.194
5. Households with children	-.151	-.091	.123
6. Households with able-bodied civilian male head	-.142	-.054	.021
Nonemployment Income Flows			
1. Basic male family head sample	-.148	-.067	.052
2. Self-weighting male family head sample	-.164	-.071	.064
3. Households with only two adults	-.151	-.086	.108
4. Households with husband as sole earner	-.139	-.089	.153
5. Households with children	-.159	-.079	.078
6. Households with able-bodied civilian male head	-.147	-.049	.0002

Notes:

[a]Elasticities are evaluated at the means pertaining to each sample.

[b]The compensated wage rate elasticity, an estimate of the substitution elasticity, is computed by the formula $\varepsilon^s = W(C^w/H - C^y)$ where w is the mean wage rate, H is mean hours of work, and C^w and C^y are wage rate and income coefficients, respectively.

Table 7

ESTIMATES OF DIFFERENTIAL EFFECTS ON HOURS OF WORK OF THE COMPONENTS OF ACCRUED NONEMPLOYMENT INCOME[a]

Demographic Group	Accrued Nonemployment Income Coefficient (Y_f^a)	Estimated Differential Effects of Components			
		Consumer Debt (DY_f^a)	Liquid Assets (LY_f^a)	Transfer Payments (TR_f^a)	Imputed Income from Business or Farm (BY_f^a)
1. Basic male family head sample	-.0478	-.1489	.0089	-.0751	.0333
	(.014)	(.070)	(.016)*	(.023)	(.030)*
2. Self-weighting male family head sample	-.0795	-.2187	.0130	-.0571	-.0257
	(.018)	(.104)	(.017)*	(.027)	(.037)*
3. Households with only two adults	-.0865	-.1507	.0119	-.0918	.0535
	(.018)	(.077)*	(.018)*	(.029)	(.035)*
4. Households with husband as sole earner	-.0827	-.1731	.0225	-.0732	.0259
	(.026)	(.104)*	(.028)*	(.038)*	(.051)*
5. Households with children	-.0799	-.1583	.0016	-.0311	-.0119
	(.021)	(.075)	(.020)*	(.031)*	(.036)*
6. Households with able-bodied civilian male head	-.0489	-.1350	.0102	-.0284	.0317
	(.014)	(.069)*	(.016)*	(.023)*	(.030)*

Note:

[a]Numbers in parentheses are standard errors. Asterisks denote cases in which coefficients are less than twice their standard errors.

Table 8

ESTIMATES OF DIFFERENTIAL EFFECTS ON HOURS OF WORK OF THE COMPONENTS OF NONEMPLOYMENT INCOME FLOWS[a]

Demographic Group	Nonemployment Income Flows Coefficient (Y_f^f)	Estimated Differential Effects of Components: Consumer Debt (DY_f^f)	Liquid Assets (ID_f^f)	Transfer Payments (TR_f^f)
1. Basic male family head sample	-.0262 (.015)*	-.3560 (.081)	-.0029 (.042)*	-.0969 (.023)
2. Self-weighting male family head sample	-.0265 (.016)*	-.4482 (.111)	.0005 (.044)*	-.1088 (.026)
3. Households with only two adults	-.0387 (.016)	-.2997 (.091)	-.0086 (.049)	-.1361 (.029)
4. Households with husband as sole earner	-.0113 (.031)*	-.6934 (.199)	-.0340 (.066)*	-.1414 (.041)
5. Households with children	-.0250 (.027*	-.3458 (.094)	-.0187 (.057)*	-.0857 (.035)
6. Households with able-bodied civilian male head	-.0272 (.014)*	-.3279 (.080)	.0051 (.042)*	-.0504 (.024)

Note:

[a]Numbers in parentheses are standard errors. Asterisks denote cases in which coefficients are less than twice their standard error.

hand, nonemployment income from liquid assets and from a business or farm does not appear to have a significantly different impact on hours of work.

Although the actual impact on hours of work of alternative sources of the nonemployment income may differ, coefficient estimates may differ for other reasons as well. It is possible, for example, that they will differ because our imputations are inexact or the approximations we have used are somewhat inappropriate. The common discount rate we have used to impute income, for example, may not be strictly appropriate and it should perhaps in principle be varied between classes of assets or even between wealth classes. Some components may also represent a more stable, assured source of income than others. Although these possibilities obscure the interpretation of differential income effect estimates, analyzing estimated differential impact gives some insight into the anatomy of the income response, and it illustrates the sensitivity of estimated income effects to the manner in which the nonemployment income variable is constructed and to the components included in it.

In addition to the difficulties already mentioned in interpreting the differential impact of nonemployment income components, it is also possible that some components are less appropriately regarded as exogenous. For example, the transfer payments component could be income conditioned or work conditioned, even though the families in which this was most likely to be a factor were excluded from the sample. On the other hand, since the estimates of labor supply response are to be used to assess the influence of transfers on hours of work, it could be argued that particular emphasis should be placed on the income effect estimate resulting from that component. In view of these difficulties of interpretation and the absence of any firm basis for relying more heavily on a component or subset of components of nonemployment income, our main emphasis will be on the overall impact of our measures of nonemployment income. And between the two overall measures we have constructed, we will rely most heavily on the measure of accrued nonemployment income, since it is the most comprehensive measure and its economic justification is most straightforward.

CURVILINEARITY IN THE WAGE RELATION

A variety of experiments with different specifications of the regression equations indicated that it is difficult to discriminate among alternative functional forms. Experiments with logarithmic equations were hampered because both the relative preferences measure and the nonemployment income variable take on negative values for some persons in our sample. Experiments allowing the labor supply function to be represented by a series of linear segments did provide some evidence of curvilinearity in the relation between hours of work and the wage rate. The evidence is consistent with a backward-bending labor supply function, although the effect is less pronounced than might be expected, and a positive relation was not obtained even at very low wage levels.

Evidence of significant curvilinearity was obtained only at about the $2 per hour wage level (see Tables 9 and 10). This estimated kink in the supply function at about the $2 level may merely reflect the impact of personal income tax, which begins to take hold at about that level, rather than curvilinearity in the underlying function in real terms. In any event, since we are primarily interested in the response of relatively low wage workers and wish to have a measure of the effect of wages net of taxes, we have taken curvilinearity in the wage relation into account. Experiments designed to explore curvilinearity in the effect of nonemployment income on hours of work failed to show consistent or statistically significant evidence that the relation should not be regarded as linear.

Estimates of wage rate elasticities and income-compensated wage elasticities at selected points on the segmented supply function are reported in Tables 11 and 12. Computing elasticities in the neighborhood of the kink and at the sample mean for wages gives rise to compensated wage rate elasticity estimates that increase up to the $2 level, decline abruptly, and increase at wages above $2 per hour. As shown in the tables, at the mean wage level they are approximately the same size as just below $2 per hour. Although we have approximated the wage relation by linear segments, we interpret the statistical

Table 9

ESTIMATED WAGE RATE COEFFICIENTS FOR A NONLINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE AND INCOME COEFFICIENTS FOR ACCRUED NONEMPLOYMENT INCOME[a]

Demographic Group	Wage Rate Coefficient (W_h)	Slope Adjustment Coefficient for Wages Greater than \$2/Hour (W_h^o)	Income Coefficient (Y_f^a)	Number of Additional Control Variables	R^2
1. Basic male family head sample	-72.14 (13.82)	-26.65 (11.13)	-.0674 (.010)	9	.134
2. Self-weighting male family head sample	-52.63 (17.59)	-46.83 (14.79)	-.0932 (.013)	9	.146
3. Households with only two adults	-69.63 (15.72)	-28.88 (12.88)	-.1098 (.014)	9	.147
4. Households with husband as sole earner	-47.05 (22.50)	-36.40 (19.54)	-.0965 (.017)	7	.146
5. Households with children	-57.47 (16.03)	-45.65 (13.10)	-.0867 (.014)	9	.155
6. Households with able-bodied civilian male head	-73.89 (13.76	-26.39 (11.10)	-.0526 (.010)	9	.133

Note:

[a]Numbers in parentheses below coefficients are their standard errors. All of the coefficients exceed their standard errors by more than a factor of 2.

Table 10

ESTIMATED WAGE RATE COEFFICIENTS FOR A NONLINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE AND INCOME COEFFICIENTS FOR NONEMPLOYMENT INCOME FLOWS[a]

Demographic Group	Wage Rate Coefficient (W_h)	Slope Adjustment Coefficient for Wages Greater than $2/Hour ($W_h^o$)	Income Coefficient (Y_f^f)	Number of Additional Control Variables	R^2
1. Basic male family head sample	-73.69 (13.83)	-29.56 (11.11)	-.0662 (.011)	9	.134
2. Self-weighting male family head sample	-53.91 (17.64)	-51.58 (14.80)	-.0690 (.012)	9	.141
3. Households with only two adults	-70.33 (15.76)	-33.54 (12.88)	-.0846 (.013)	9	.143
4. Households with husband as sole earner	-47.89 (22.56)	-41.00 (19.56)	.0875 (.019)	7	.141
5. Households with children	-58.14 (16.06)	-49.90 (13.08)	-.0761 (.016)	9	.152
6. Households with able-bodied civilian male head	-75.01 (13.76)	-28.82 (11.08)	-.0483 (.011)	9	.132

Note:

[a]Numbers in parentheses below coefficients are their standard errors. All of the coefficients exceed their standard errors by more than a factor of 2.

Table 11

ESTIMATED WAGE RATE AND SUBSTITUTION ELASTICITIES
EVALUATED AT DIFFERENT WAGE LEVELS FOR ACCRUED NONEMPLOYMENT INCOME[a]

Demographic Group	Elasticity Estimated	Wage Rate Less than $2/hr	Wage Rate Over $2/hr	Wage Rate at Sample Mean
1. Basic male family head sample	Wage rate (ε^W)	-.066	-.091	-.135
	Compensated (ε^S)	.068	.043	.064
2. Self-weighting male family head sample	Wage rate	-.048	-.090	-.145
	Compensated	.138	.096	.155
3. Households with only two adults	Wage rate	-.064	-.089	-.134
	Compensated	.156	.131	.198
4. Households with husband as sole earner	Wage rate	-.043	-.076	-.124
	Compensated	.149	.116	.190
5. Households with children	Wage rate	-.052	-.094	-.141
	Compensated	.122	.080	.120
6. Households with able-bodied civilian male head	Wage rate	-.067	-.091	-.136
	Compensated	.039	.015	.022

Note:

[a]Elasticities below and above $2/hr are evaluated at $2/hr and mean hours using wage coefficients applicable below and above $2/hr. Estimates at sample mean use both mean hours and wages and wage coefficient applicable above $2/hr.

Table 12

ESTIMATED WAGE RATE AND SUBSTITUTION ELASTICITIES
EVALUATED AT DIFFERENT WAGE LEVELS FOR NONEMPLOYMENT INCOME FLOWS[a]

Demographic Group	Elasticity Estimated	Wage Rate Less than $2/hr	Wage Rate over $2/hr	Wage Rate at Sample Mean
1. Basic male family head sample	Wage rate (ε^W)	-.063	-.095	-.141
	Compensated (ε^S)	.064	.037	.055
2. Self-weighting male family head sample	Wage rate	-.049	-.095	-.153
	Compensated	.089	.042	.068
3. Households with only two adults	Wage rate	-.064	-.095	-.143
	Compensated	.106	.075	.113
4. Households with husband as sole earner	Wage rate	-.043	-.081	-.133
	Compensated	.131	.093	.152
5. Households with children	Wage rate	-.053	-.098	-.147
	Compensated	.099	.054	.081
6. Households with able-bodied civilian male head	Wage rate	-.068	-.094	-.140
	Compensated	.028	.002	.003

Note:

[a]Elasticities below and above $2/hr are evaluated at $2/hr and mean hours using wage coefficients applicable below and above $2/hr. Estimates at sample mean use both mean hours and wages, and wage coefficients applicable above $2/hr.

evidence as indicating a tendency toward a less pronounced wage rate effect at low wage levels rather than regarding the kink and the precise wage level at which it occurs as being significant. This interpretation leads us to regard the compensated wage rate elasticity as approximately constant, at least for wage levels below the mean. Thus, for the simulations of labor supply responses to income maintenance programs, the estimates of the compensated wage rate effect and the income effect for relatively low wage workers will both be regarded as constant.

APPRAISAL OF THE RESULTS

The primary feature of the estimates of labor supply response presented above is that they show a tolerable degree of consistency between major subgroups of the sample. They do not appear to be overly sensitive to the particular selection of control variables included, with the exception of the relative preferences control variable and age,[1] which both have a significant impact on estimates of the income effect. Only the results for a selection of major subgroups are reported in the text, however, and the supplementary results reported in Appendix B merit some comment.

The possibility of differential labor supply responses on the part of demographic groups was the principal reason for separately analyzing a number of subgroups in the sample. A discussion of some of these results will be a useful examination of the evidence on whether important differences in labor supply response exist, and it will indicate some of the pitfalls in analyses designed to explore differences in response.

[1] The influence of age on income effect estimates is undoubtedly attributable to asset accumulation patterns over the life cycle. Differences in nonemployment income among workers at a given age are expected to result in labor supply differences through the income effect. The hours worked by older workers, however, do not differ from the hours of young workers simply because older workers have on the average larger amounts of nonemployment income. The age variable can be regarded as a control variable for the factors other than nonemployment income that influence hours of work over the life cycle.

The behavior of Negroes as compared with whites is an obvious place to begin since Negroes are considered separately in some other studies[1] and because with relatively lower incomes Negroes can be expected to share more than proportionately in income maintenance programs. The simplest comparisons appear to suggest a significantly weaker response of hours of work to the accrued nonemployment income variable for Negroes. Taking Negroes separately results in smaller and less significant income effect estimates than in the overall sample. Similarly, the sample supplementing the Current Population Survey sample, oversampling Negroes, results in smaller estimates than the GPS based sample. For the flow version of nonemployment income, the estimates for Negroes are similar to those for the overall sample. A closer inspection of results for the accrued version for Negroes and whites gives rise to a suspicion that factors other than differential labor supply response may be at work. When the behavior of Negroes in poor and nonpoor areas of the central cities of SMSAs is compared with that of their white counterparts, the income effect appears to be at least as strong for Negroes, although smaller sample sizes lead to relatively high standard errors for these subgroups compared with larger subgroups of the sample. A separate regression for the South census region yields results similar to those for the country as a whole. Whites and Negroes in poor areas in the rural South also show little evidence of differential response.

These results indicate that simply stratifying by color may yield misleading evidence on differential response, perhaps because the samples differ substantially with respect to variables other than color. The relative preferences variable also appears to be a factor affecting income effect estimates for subgroups. In general, the preferences measure seems to have less influence in regressions with relatively few observations, which may be partly a result of relatively

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[1] See, for example, K. Egge, "Intercolor Differences in Labor Supply Among Older Men," December 1969, unpublished manuscript, and C. Russell Hill, "The Economic Determinants of Labor Supply for the Working Urban Poor," University of Michigan, Institute of Public Policy, Studies Discussion Paper No. 14, May 1970.

poorer estimates of predicted asset holdings. Almost invariably, when the relative preference measure has little influence in the regression, estimates of the income effect are relatively small, often insignificant, and sometimes positive. Measurement of relative preferences for the poor, for Negroes, and for persons with low socioeconomic status may also be particularly imprecise because variation in measured asset holdings for these groups is more likely to be transitory or random. Estimation of normal asset holdings would thus have less meaning, and deviations from normal asset holding ratios would contain less information on relative preferences. The nonemployment income measure would, of course, also suffer from these deficiencies.

Whether labor supply response differs for families that would be eligible for income maintenance programs because of their income levels is also an important question. Direct investigation of this question, by separately analyzing a low income subgroup, can result in seriously misleading results. Stratification by relatively narrow income intervals forces a strong negative relation between hours of work and the wage rate simply because variation in hours offsetting variation in wages is the only pattern consistent with a narrow income interval, apart from variation in income from sources other than earnings of the head. This pattern is evident in the regressions in Appendix B for low income subgroups.

Regressions for separate age categories suggest that there may be a tendency for a more pronounced income effect for young workers (family heads under 25). This may reflect a broader range of prominent alternatives to work for young workers, such as investment in education. A smaller income effect is suggested by estimates for older workers (over 55), but this may result from the fact that the method we have used to construct a measure of relative preference is conceptually less appropriate for this age class. Our treatment of nonemployment income streams is strictly applicable for workers with infinitely long working lives, and this approximation, while not a serious oversimplification for young and middle-aged workers, becomes increasingly inappropriate as older workers are considered.

The problems that accompany the interpretation of estimates obtained by stratifying the sample in various ways and separately analyzing labor supply response raise the issue of the extent to which differing estimates for different population groups reflect differential underlying patterns of labor supply response and the extent to which they are caused by differences in other factors. The overall evidence gives us no firm basis for concluding that there are important differences in labor supply response, except perhaps for relatively young workers. We have taken the view, therefore, that estimates from samples that are broadly representative of the population are preferable to those obtained from subgroups for the analysis of the impact on labor supply of income maintenance programs.

In light of the discussion above and the evidence presented in the tables, what should be regarded as reasonable estimates of the income effect and income-compensated wage rate effect for the purpose of analyzing the effects of income maintenance programs with differing income guarantee levels and implicit tax rates? Following our inclination to rely most heavily on estimates based on accrued nonemployment income, we can say that income effect estimates for broadly representative samples range from -.05 to -.11 with most of the estimates larger than -.09. Most of the compensated wage rate effect estimates are in the range from .04 to .2. The choice of a reasonable range of estimates should, however, take into account presumptive biases in the estimates.

We have identified three major sources of possible systematic bias. The first results from the manner in which the wage rate is computed. Since the wage rate is computed by dividing earnings by hours of work, and the hours variable is a component of the dependent variable, there is a strong presumption that some negative bias in estimates of the wage rate coefficient occurs. The second bias results from a presumption that differences in relative preferences for asset accumulation are only imperfectly controlled. Given the strong influence of the preferences variable on income effect estimates, it seems likely that the income effect is more pronounced than our estimates

indicate. The third factor is that our nonemployment income variable is likely to be subject to considerable measurement error, and a bias toward zero in the income effect estimate would be expected.[1] Bias from the first source would affect only estimates of the compensated wage rate effect, while bias from the other two sources affects both income and substitution effect estimates. All three of the biases, however, operate in the same direction; they suggest that the magnitude of both income and substitution effects is likely to be larger than the estimates we have obtained.

On the basis of the evidence presented and our judgments on the most likely character of biases in the estimates, we have chosen three sets of estimates of income and substitution effects to use in analyzing labor supply response to alternative income maintenance programs.

	Substitution Effect (Elasticity)	Income Effect (Slope Coefficient)
Low estimate	.10	-.09
Intermediate estimate	.20	-.10
High estimate	.25	-.11

The low estimates take an income effect estimate at the low end of the range of estimates that we prefer to rely on most heavily. The substitution effect estimate with which it is paired is consistent with a curvilinear wage rate relation somewhat more pronounced than our estimates suggest. The intermediate estimate of the income effect is roughly in the middle of the range of estimates from regressions 2 through 5. The intermediate estimate of the substitution effect is consistent with a slightly less pronounced wage rate effect than indicated by our estimates. The high estimate of the income effect is near the high end of the range of our estimates, and the substitution effect

[1] The measure of nonemployment income we use is, of course, only an approximation to the conceptually appropriate measure. While this is an additional source of possible bias, neither the sign nor the magnitude of bias from this source can be identified with any confidence.

estimate with which it is coupled is consistent with an extremely low estimate of the wage rate response at relatively low wage rates. Given the income effect estimate, the size of the substitution effect estimate in fact implies a slightly positive wage rate relation at wages of $2 or below.

The low estimates in our judgment are reasonable values for the weakest labor supply response to change in wage rates or income levels that can be inferred from the overall evidence. Admittedly, a number of estimates have been presented that are significantly lower, but we regard the evidence based on accrued nonemployment income as most reliable, and we prefer to rely most heavily on the evidence from regressions 2 through 5 presented in the text. The intermediate estimates are our preferred estimates on the basis of the evidence. The high estimates in our judgment represent the maximum response, particularly for the substitution effect, that can be inferred from the statistical evidence. This set of estimates, therefore, should encompass the range of plausible estimates of income and substitution effects based on the evidence we have assembled.

VI. THE SIMULATIONS

The possibility of designing income maintenance programs that offer inducements to work to families who are eligible for income supplements, while promoting equity between those who work and those who do not, is regarded as one of the primary advantages of the negative income tax approach. Implementing a program of this nature involves a restructuring of work incentives, both for those families currently receiving welfare payments and for families not previously covered by income maintenance programs. The incentive to increase family income by obtaining employment or increasing work effort will be strengthened for those currently receiving welfare, if introduction of the program results in lower implicit tax rates on earnings at given income levels. Extension of the program to families not previously covered, on the other hand, will result in some weakening of their work incentives.

Although this study is concerned with families not hitherto eligible for income supplement, a realistic overall assessment of the impact of income maintenance programs should also take into account changes in work patterns for families currently receiving welfare payments. If incentives to work are considerably strengthened relative to current welfare programs, these families can be expected to increase the degree to which they raise their incomes through earnings. The beneficial effects of restructured incentives are likely to become particularly evident over time as incentives for family dissolution are reduced and because such programs facilitate mobility from reliance on income supplements to employment whenever family circumstances permit. Although improvements in incomes and employment expected to result from restructured incentives for current welfare recipients are difficult to estimate and are not estimated in this Report, they should not be overlooked in any assessment of the overall impact of income maintenance programs.

Our analysis focuses on the impact of income maintenance programs on families constituting the main group to which income supplements

would be extended under current proposals. The simulations of the impact of alternative programs that are presented in this section take into account, therefore, the principal segment of the population whose work incentives would be adversely affected. The simulation results reflect changes in earnings and program costs due to adjustments of hours of work of male heads of families as well as the influence of these estimated work adjustments on program eligibility.

In the first part of this section we discuss the method we used to determine family eligibility for program participation and describe the manner in which labor supply adjustments, earnings and income changes, and program costs are estimated. The program designs we have analyzed are discussed in the second part. In the last part of the section we present a variety of summary measures of the impact of alternative programs.

METHODOLOGY

Our approach to the analysis of the impact of income maintenance programs in this study places primary emphasis on obtaining aggregate estimates of their impact such as number of participating families, hours and earnings changes, and program costs, and the importance of these measures in the context of the overall economy. Although this approach yields estimates in which the number of participating families and their composition differ as a result of the alternative program parameters considered, the method of determining eligibility for program participation is the same for each of the programs.

The method for determining eligibility for participation can be described in terms of Figure 2, the diagram conventionally used to analyze work-leisure choices. In the absence of a negative income tax program, the line XY represents the family's budget constraint.[1] Given

[1]For simplicity in the diagrammatic exposition, earnings of the male head is the only component of family income considered since our analysis takes into account only his labor supply response. Other components of family income are, of course, included in the simulation without allowing for labor supply changes by other family member.

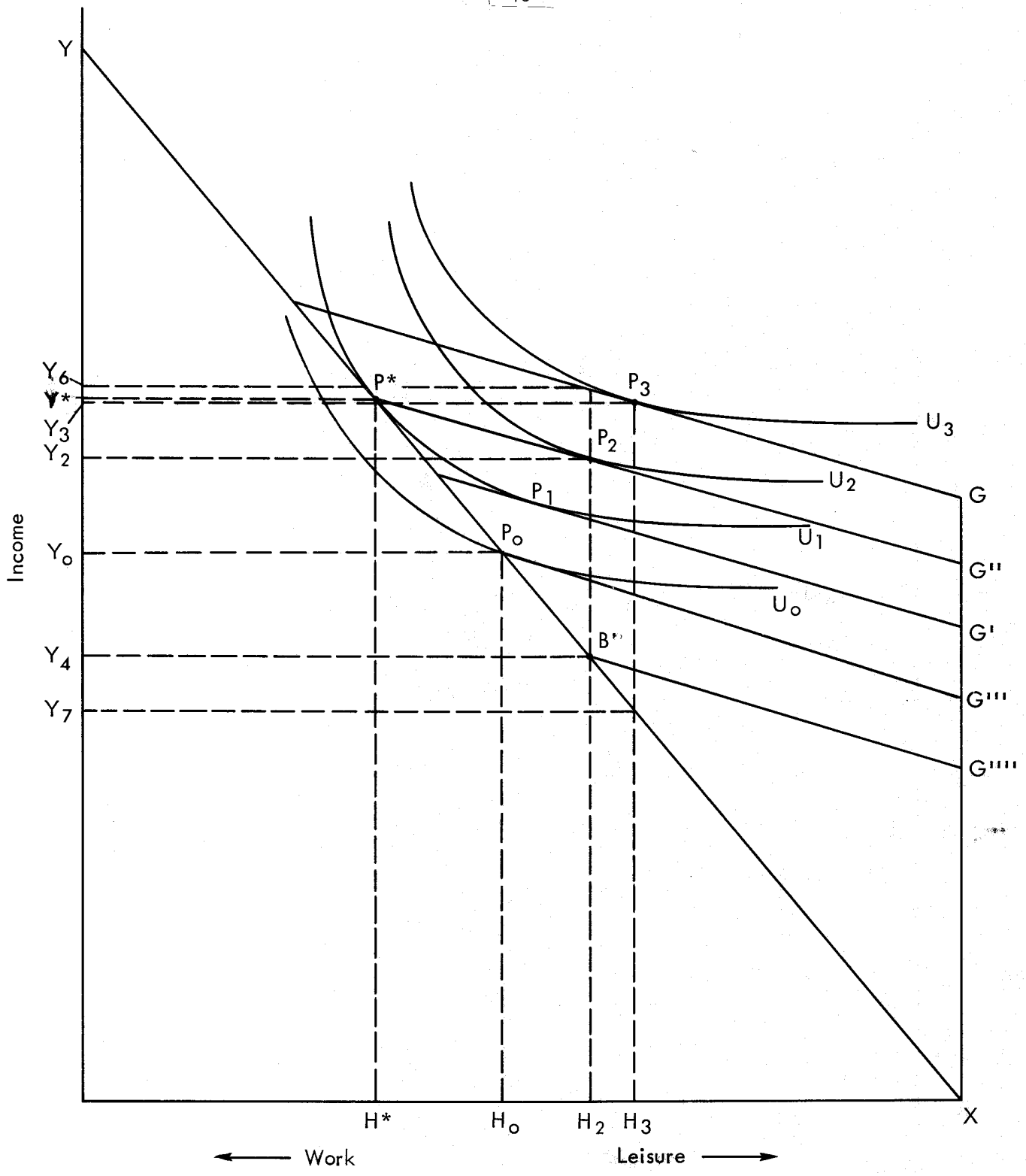

Fig. 2 -- Work-leisure choices under a negative income tax

the family's preference map, equilibrium occurs at the point P^* on indifference curve U_1. The family receives Y^* dollars of income from the husband's earnings and he supplies H^* hours of work.

Introduction of a negative income tax program can be represented by a new budget constraint such as GBY, where the family receives an income guarantee of G, and a percentage of each dollar of earnings, t, is simultaneously taxed away. The analysis of whether a family will choose to participate can be carried out most simply by considering only a single preference map and implicit tax rate and varying the level of the income guarantee. This approach corresponds analytically to considering the responses to a given program of families with the same preferences and wage rates of the head, but different numbers of dependent children. A family will choose to participate in the program if it can attain a higher indifference curve under the program than U_1 attained at P^*. Thus at the income guarantee level G', a family will be indifferent; it will choose to participate at higher levels but at levels below G' it will not.

The constant utility criterion can only be approximated in practice, and consequently lower and upper bounds for participation were established. Under the procedure for estimating lower bounds for the number of participating families, participation is definitely advantageous to the family, and families qualifying under this procedure can be regarded as "definite participants." Families who are not definite participants but who qualify under the procedure for establishing upper bounds can be regarded as "possible participants" since there is no way of determining what proportion of them would actually find participation advantageous. Families ineligible under the upper bound procedure would definitely not find it advantageous to participate and they can be regarded as "definite nonparticipants."

Definite participation does not require that the family's income after it chooses to participate be at least as high as its income prior to introduction of the program. Since the tax rate on earnings under the program reduces the relative price of leisure, a family may

find it advantageous to reduce hours of work in response to the incentives created by the program because it values the additional leisure more highly than the income forgone. Such an outcome is depicted in the diagram at income guarantee level G'', where the reduction in hours to H_2 and the income decline to Y_2 leads to attainment of the higher indifference curve U_2. Since the budget line associated with G'' passes through P^*, the family is at least as well off with the program as without, and it will definitely participate. At any guarantee level below G'', it is impossible to be certain that the family could attain a higher indifference curve. Thus whenever income under the program at H^* hours of work would be at least as high as family income in the absence of the program, the family will definitely participate. The procedure involving this comparison establishes a lower bound for the number of potential program participants.

Although families who would definitely be participants in a program can be identified without an explicit consideration of the hours of work adjustments that would occur under the program, it is necessary to analyze hours of work adjustments to distinguish possible participants from definite nonparticipants and thus establish an upper bound. Under the program represented by the budget constraint $G''P^*Y$, the subsidy payments from the program are just sufficient, at H^* hours of work, to compensate the family for earnings lost through imposition of the implicit tax rate, t. The response of hours of work in this case is analytically equivalent to the manner in which the income-compensated wage rate effect was estimated. Under income guarantee level G'', therefore, initial hours of work would be reduced by an amount equal to $\varepsilon^s \cdot t \cdot H^*$, where ε^s is the income-compensated wage rate elasticity. Hours of work after adjustment in response to the tax rate, H_2, are thus equal to $H^* (1 - \varepsilon^s \cdot t)$.

At the point P_2, however, a higher indifference curve is attained than at P^*. The income guarantee could be reduced, consequently, with participation in the program remaining advantageous to the family. As lower guarantees are considered, hours of work are increased through the income effect; they are increased from H_2 by C^y for each dollar

of income that the guarantee level is reduced below G''. The income effect response of hours of work that is traced out as lower levels of the guarantee are considered passes through P_1 (at income guarantee G', a level that cannot be determined without precise knowledge about the shape of the indifference curve), and it finally passes through P_o at the intersection of the original budget constraint XY and the constraint under the program with income guarantee level G'''. At the point P_o, income under the program at H_o hours is equal to income in the absence of the program at those hours. With any further reduction in the income guarantee level below G''', the family could definitely attain a higher indifference curve by not participating in the program. At any level above G''' (but below G''), on the other hand, it is impossible to be certain that the family could attain a higher indifference curve without participating. Thus, comparison of family income under the program at H_o hours of work with income in the absence of the program at H_o, allows a distinction between possible participants and definite nonparticipants and establishes an upper bound for the number of participating families.

In the simulation, the lower bound was established as outlined above. As a result of an oversight when the simulation procedure was programmed, the income effect was not taken into account in estimating the upper bound. Consequently, the upper bound estimates (presented in Appendix C) correspond to the point B under income guarantee level G'''. The procedure under which these upper bound estimates were obtained involved a comparison of income under the program at H_2 hours of work with income in the absence of the program at the same hours. The upper bound estimates, therefore, include some families that should appropriately be regarded as definite nonparticipants.

When the participants under a given program have been identified, their labor supply adjustments can be estimated. As noted above, the hours adjustment resulting from the substitution response to the tax rate, ΔH^S, is $\varepsilon^S \cdot t \cdot H^*$. The hours response through the income effect can be analyzed if one considers a guarantee level such as G. The income that would be attained under the program at H_2 hours of work is,

in this case, in excess of the amount needed to compensate for the earnings loss implied by the tax rate by the amount $(Y_6 - Y_2)$ when the impact of the program is estimated by considering only definite participants. The additional reduction in hours resulting from the income effect, ΔH^y, is $(H_2 - H_3)$. It is estimated as the product of the income coefficient, C^y, and the income change $(Y_6 - Y_2)$. The total adjustment in work effort resulting from the program, ΔH^t, is obtained by adding the hours adjustments from each source (that is, $\Delta H^t = \Delta H^s + \Delta H^y$).

When hours adjustments are considered under the procedure for establishing upper bounds, the substitution component is estimated as indicated above. For guarantee levels above G'' the income effect is also computed in the same way. For guarantee levels between G'' and G''', on the other hand, income is less than sufficient to compensate for the imposition of the tax. Families facing guarantee levels in that range -- possible participants -- would as a result be subjected to a work-inducing income effect. The income effect for families choosing to participate at income guarantee level G''' should, therefore, be computed by using the income difference $(Y_o - Y_2)$. The hours adjustments reported in our simulation results (in Appendix C) under the upper bound procedure actually used use the income difference $(Y_6 - Y_4)$, and hours reductions are consequently overestimated by $(H_2 - H_o)$.

The magnitude of reductions in hours of work by program participants is itself of considerable interest because attitudes toward the program and participants are likely to be strongly affected by its impact on work patterns of the poor. But it is also important to consider the loss in the production of goods and services that these hours reductions entail. The reduction in earnings generated by hours adjustments for each family is $\Delta H^t \cdot W$, where W is the wage rate of the family head.[1]

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[1]The income loss to the family from the hours adjustments is only $\Delta H^t \cdot W(1-t)$; the difference between the earnings reduction and the income loss is a component of the subsidy under the negative income tax program.

Under competitive conditions the worker's wage is equal to the value of his marginal product, so this measure can be regarded as an estimate of the direct production loss occasioned by the program.

The direct production loss does not, however, represent a net loss to society resulting from the program. Families under the program receive additional leisure, and the value they place on that leisure is an important offset to the production loss.[1] There is, however, a net loss to society that results from the inability of program participants to obtain the full value to society of the output that could be produced by additional work. The tax rate applicable to earnings creates a gap between the amount consumers are willing to pay for the production achieved through an hour of work and the net return to a participant for giving up an hour of leisure. This net loss to society, the welfare cost or "deadweight loss," is a consequence of the resource misallocation represented by a socially nonoptimal division of participants' time between work and leisure. It is a measure of the value a family would place on the opportunity to make the husband's work-leisure choice in response to the market tradeoff between income and leisure instead of the tradeoff resulting from the tax rate.[2]

The amount of the subsidy, after hours adjustments have been taken into account, is of course of great interest for assessing the costs of the program. At guarantee level G, the amount of the subsidy is $(Y_3 - Y_7)$, the family's income after hours adjustments less what would have been earned in the absence of the program at H_3 hours of work.

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[1] Nonparticipants who pay the additional taxes required to support the program will presumably, on balance, increase their work effort resulting in a production gain offset by a reduction in leisure for them.

[2] Welfare cost was estimated using the formula:

$$\text{Welfare cost} = 1/2\ HW\varepsilon^{s}\ t^{2}.$$

For a detailed exposition and derivation, see Arnold C. Harberger, "Taxation, Resource Allocation, and Welfare," *The Role of Direct and Indirect Taxes in the Federal Revenue System*, Princeton University Press, Princeton, 1964, pp. 25-70.

Since part of the subsidy will in general be used to purchase leisure, the difference between initial income, Y^*, and income under the program, Y_3, will be less than the amount of the subsidy. It can in fact be negative (as shown in Figure 2).

THE PROGRAMS

Although numerous variations on the negative income tax concept have been propounded, we concentrate our analysis on two proposals that have recently received serious discussion: President Nixon's Family Assistance Plan (FAP) and the recommendations of the President's Commission on Income Maintenance Programs (PC). The sensitivity of labor supply to changes in the FAP tax rate and guarantee level is also examined.

FAP provides a guarantee of $500 for each of the first two family members and $300 for each additional member. To qualify for FAP at least one family member must be a dependent child under 18 (21 if a full-time student); and the family's net assets (excluding their home, household goods, personal effects and property essential to their self-support) cannot exceed $1500. Income is to be taxed at 50 percent. The following income components, however, are tax exempt: the first $720 of earned income; "irregularly" earned and unearned income up to $30 per quarter of each type; earnings of a child in school; training allowances; scholarships and fellowships; earnings used to pay for child care; food stamps; public and private charity; and produce grown at home.[1]

Since FAP has been grafted directly to the existing food stamp program (FSP), it is important that the simulations be based on the combined program (FAP,FSP), rather than on FAP alone. The food stamps

[1]The preceding is based on the version of FAP passed by the House of Representatives and reported in the *Congressional Record*, April 16, 1970, pp. H 3173 - H 3175; H 3209 - H 3220. At the time we performed our simulations, FAP had not yet passed the Senate. The version of FAP that finally emerges, if one does, could differ considerably from the one reported here.

component of FAP,FSP annually guarantees $296.04 worth of food stamps to each family plus an additional $183.60 of food stamps for each person in the family. It taxes a family's income -- including any subsidies received under FAP -- at approximately 18.05 percent.[1]

The plan recommended by the President's Commission on Income Maintenance Programs is comparatively simple. The plan proposes a guarantee of $750 for each of the first two adults in a family and $450 for each additional family member. All income, earned and non-earned, is to be taxed at a 50 percent rate. In addition, 10 percent of the value of net assets (other than personal effects and furnishings) are to be taxed at the 50 percent rate.

Except for small differences that are described in Appendix A, the sample we use for our simulation is similar to the one used in the regressions. Although our regressions were run with an unweighted sample, our simulation utilizes the "person sample weight" provided in the SEO file. These weights account for certain types of persons having a higher probability than others of being included in the original SEO sample and of being interviewed.

To carry out the simulation pre- and post-program budget equations must be defined. These equations approximate the programs described above as closely as the data and a reasonable interpretation of program provisions[2] permit. Since taxable income is defined differently under FAP,FSP than it is under PC, it was necessary to establish a different

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[1]The value of the food stamp subsidy (FSR) is determined on the basis of a rather complex schedule to a family's size (N) and monthly income (MI). Using the schedule as the source of data points in a regression, we obtained the following estimate of the monthly guarantee level and of the implicit tax rate:

$$FSR = 24.67 + 15.30\ N - .1805\ MI$$
$$\qquad\qquad (.3739) \qquad (.0054)$$

(Standard errors are in parentheses)
Standard error of estimate = $4.8
$R^2 = .95$ Number of observations = 95

[2]Considerable administrative discretion is allowed under FAP. How, for example, will the provision exempting $30 of "irregularly" earned income per quarter from taxation be interpreted? In general, we assume program provisions will receive a liberal interpretation.

set of equations for each program. The superscripts t and e refer, respectively, to taxable and tax-exempt income.

$$Y_{PP(FAP+FSP)} = HW_h + E_b + E_c + Y_f \quad (1)$$

$$Y_{FAP+FSP} = (1-o)\,[(1-m)\,(HW_h^t + E_b^t + Y_f^t) + HW_h^e + E_b^e + E_c^e + Y_f^e + C] + B \quad (2)$$

$$Y_{PP(PC)} = HW_h + E_b + E_c + Y_f + Y_a \quad (3)$$

$$Y_{PC} = (1-n)Y_{PP(PC)}^t + F, \quad (4)$$

where

$Y_{PP(FAP+FSP)}$ = family income before the introduction of a combined family assistance plan plus food stamp program

$Y_{FAP+FSP}$ = family income for participants after the introduction of FAP, FSP

$Y_{PP(PC)}$ = family income before the introduction of the President's Commission program

Y_{PC} = family income for participants after the introduction of PC

$Y_{PP(PC)}^t$ = $Y_{PP(PC)}$

HW_h = head's earnings (hours worked times the hourly wage rate)

E_b = earnings of persons in family, other than head or students in school

E_c = earnings of students in school

Y_f = family's nonearned income

Y_a = imputed earnings from net assets (10 percent of net worth, excluding furnishings and personal effects)

HW_h^e = \$720, if $HW_h \geq$ \$720; $HW_h^e = HW_h$, if $HW_h <$ \$720

$E_b^e = \$120$, if $E_b \geq \$120$; $E_b^e = E_b$, if $E_b < \$120$

$E_c^e = E_c$

$Y_f^e = \$120$, if $Y_f \geq \$120$; $Y_f^e = Y_f$, if $Y_f < \$120$

$HW_h^t = HW_h - HW_h^e$

$E_b^t = E_b - E_b^e$

$Y_f^t = Y_f - Y_f^e$

N = number of persons in family

$Q = N$, if $N < 8$; $Q = 8$, if $N \geq 8$

$B = \$296.04 + \$183.60 \cdot N$, the FSP guarantee

$C = \$400 + \$300 \cdot N$ (or $\$500 + \$750 \cdot Q$), the FAP guarantee

$F = \$600 + \$450 \cdot N$, the PC guarantee

$o = .1805$, the FSP tax rate

$m = .5$ (or .25 or .75), the FAP tax rate

$n = .5$, the PC tax rate

Note that for the FAP,FSP program, the sensitivity of the results to changes in the administration's proposed tax rate and guarantee level was tested: m is permitted to take on two values, .25 and .75, in addition to .5, and C is set equal to $\$500 + \$750 \cdot Q$ as well as to $\$400 + \$300 \cdot N$.

Five addtional points about the FAP,FSP program should be made. First, in accordance with FAP's eligibility requirements, families without dependent children under 18 years (21 years if attending school) are not permitted to participate in the simulated FAP,FSP program, no matter how low their income. Families whose combined holdings in farms, businesses, real estate (excluding their own home), bank accounts, bonds and stocks exceeded $2000 were similarly excluded.

Second, food stamps are treated as cash income receipts. Whatever differences in utility may occur from receipt of a dollar and receipt of a dollar's worth of food stamps are disregarded.

Third, since the states in which households are located are suppressed in the SEO file, state supplements to FAP have not been considered. It should be noted, however, that as the law currently stands, states are not required to supplement the incomes of the working poor male family heads except during periods of unemployment. How, in fact, state supplementation will actually be administered in the various states is still unclear.

Fourth, because of the relatively low tax rate associated with food stamps, it will pay some families to participate in the food stamp segment of FAP,FSP, but not in the family assistance program.[1] To separate FAP+FSP participants, FSP participants, and nonparticipants, a three-way comparison of incomes, at H_1 and H_2, is necessary.[2] The budget equation for the pure food stamp program is defined as follows:

$$Y_{FSP} = (1-o)\ Y_{PP(FAP+FSP)} + B,$$

where Y_{FSP} = family income for FSP participants.

Fifth, there may be a few families whose initial earnings are greater than $720, but fall below $720 as the husband reduces his work effort. In this case, the marginal FAP tax rate that is applicable to the family falls to zero. To keep the simulation manageable, however, we assume that the marginal tax rate that is applicable at the family head's initial hours of work remains applicable throughout the adjustment process. Similarly, we do not permit families to switch from a pure FSP to the combined FAP+FSP as the head's work effort is reduced, although in a few cases it would be rational for them to do so.

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[1] For certain values of m and C, participation in FAP but not in FSP would be optimal for some families. (A check showed, however, that this was not the case when $m = .5$ and $C = \$400 + \$300 \cdot N$). To facilitate comparisons between programs with different dimensions this possibility was neglected.

[2] Since t is lower for FSP than for FAP+FSP, the substitution response differs under the two options. This problem was circumvented by assuming that as a first step families compare FAP+FSP with the no program situation and with the pure food stamp program at the H_2 associated with the FAP+FSP tax rate. Those who do not select FAP+FSP then make a second comparison; this time between FSP and no program at the H_2 associated with the FSP tax rate.

THE SIMULATION RESULTS

Aggregate Aspects of Negative Income Tax Programs

Some of the major questions concerning the aggregate impact of alternative programs are: How many families will participate in the program? What is the total cost of the subsidy provided by the program? By how large a fraction is labor supply reduced? What is the cost in terms of production foregone of the reduction in work effort? How large are these costs in the context of the overall economy? Table 13 presents the evidence from the simulation on these questions.

Before we consider the estimates themselves, we shall discuss some aspects of their scope and construction. First, the results pertain to a limited, though extremely important, segment of the population: families headed by working married males under 62 years of age. This is the largest population group eligible for coverage under proposed programs but previously excluded from most income maintenance programs. It is, therefore, the principal segment of the population whose work incentives will be adversely affected by programs such as those proposed by the Administration and the President's Commission. Nevertheless, there are other potential participants, such as families headed by older males or by females, that should be taken into account to obtain estimates of the comprehensive aggregate impact of programs. Furthermore, only the husband's initial response to each program is considered. Secondary effects or reactions of other family members are not taken into account.[1]

Second, the sample used in the simulation seriously underrepresents the total number of families in the population that are headed by working males less than 62 years old. Observations were removed, for example,

[1]The simulation procedure attributes the entire initial response to the imposition of a negative income tax to the husband. Adjustments of other family members are neglected. In principle, of course, adjustments of work effort would be made simultaneously by the entire family with hours of work reallocated among the family members.

Table 13A

ESTIMATED AGGREGATE IMPACT OF PROGRAM
USING THE LOWER BOUND PROCEDURE AND THE INTERMEDIATE SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .20 and ϵ^y = -.10)

Simulated Programs	Number Program Participants (thousands)		Total Subsidy ($ millions)		Total Production Loss ($ millions)		Total Welfare Cost ($ millions)		Hours Reduction as a Percent of all Hours Worked by Sample Population		Production Loss as a Percent of Total Earnings of Sample Population		Hours Reduction as a Percent of All Hours Worked by Labor Force		Production Loss as a Percent of Total Earnings of Labor Force	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
PC FAP,FSP	4004.	5932.	4925.8	7297.7	2251.1	3335.1	382.4	566.5	1.58	2.33	1.90	1.34	0.74	1.10	0.47	0.70
C=$400+$300·N																
m = .5																
FAP+FSP	2316.	4127.	4077.1	7265.1	1430.3	2548.8	280.1	499.1	1.15	2.05	0.57	1.02	0.54	0.97	0.30	0.53
FSP	3409.	3865.	803.5	910.9	820.4	930.1	59.6	67.5	0.45	0.51	0.33	0.37	0.21	0.24	0.17	0.20
m = .25																
FAP+FSP	7457.	8531.	9336.1	10680.2	4447.3	5087.7	545.7	624.2	2.68	3.07	1.78	2.04	1.26	1.45	0.93	1.07
m = .75																
FAP+FSP	999.	2324.	2210.0	5143.3	532.2	1238.5	158.7	369.3	0.59	1.36	0.21	0.50	0.28	0.64	0.11	0.26
FSP	4723.	5403.	1594.2	1823.7	1178.4	1348.1	77.5	88.7	0.69	0.79	0.47	0.54	0.32	0.37	0.25	0.28
C=$500+$750·M																
m = .5																
FAP+FSP	9068.	10280.	21455.3	24322.6	9020.7	10226.2	1556.5	1877.9	5.27	5.97	3.61	4.09	2.48	2.82	1.89	2.14
m = .25																
FAP+FSP	13710.	14568.	34512.6	36673.1	13809.7	14674.2	1226.4	1303.2	7.08	7.52	5.53	5.87	3.34	3.55	2.90	3.08
m = .75																
FAP+FSP	5412.	6191.	13748.0	15727.4	5147.1	5888.1	1534.7	1755.6	3.65	4.18	2.06	2.36	1.72	1.97	1.08	1.23
FSP	370.	394.	32.7	34.8	91.5	97.3	7.7	8.2	0.04	0.05	0.04	0.04	0.02	0.02	0.02	0.02

Table 13B

ESTIMATED AGGREGATE IMPACT OF PROGRAM
USING THE LOWER BOUND PROCEDURE AND THE LOW SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^g = .10 and ϵ^y = -.09)

Simulated Programs	Number Program Participants (thousands)		Total Subsidy ($ millions)		Total Production Loss ($ millions)		Total Welfare Cost ($ millions)		Hours Reduction as a Percent of all Hours Worked by Sample Population		Production Loss as a Percent of Total Earnings of Sample Population		Hours Reduction as a Percent of All Hours Worked by Labor Force		Production Loss as a Percent of Total Earnings of Labor Force	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
PC FAP,FSP	4004.	5932.	4507.9	6678.5	1440.5	2134.1	191.2	283.3	0.99	1.47	0.58	0.85	0.47	0.69	0.30	0.45
C=$400+$300·N																
m = .5																
FAP+FSP	2316.	4127.	3763.8	6706.8	915.7	1631.7	140.1	249.5	0.75	1.33	0.37	0.65	0.35	0.63	0.19	0.34
FSP	3409.	3865.	740.9	839.9	483.1	547.7	29.8	33.8	0.26	0.30	0.19	0.22	0.12	0.14	0.10	0.11
m = .25																
FAP+FSP	7457.	8531.	8726.8	9983.3	2867.9	3280.8	272.8	312.1	1.75	2.01	1.15	1.31	0.83	0.95	0.60	0.69
m = .75																
FAP+FSP	999.	2324.	2030.9	4726.5	339.3	789.8	79.3	184.6	0.38	0.89	0.14	0.32	0.18	0.42	0.07	0.17
FSP	4723.	5403.	1510.8	1728.3	728.4	833.2	38.8	44.3	0.42	0.48	0.29	0.33	0.20	0.23	0.15	0.17
C=$500+$750·M																
m = .5																
FAP+FSP	9068.	10280.	19587.8	22205.5	5922.8	6714.4	823.2	938.9	3.50	3.97	2.37	2.69	1.65	1.87	1.24	1.41
m = .25																
FAP+FSP	13710.	14568.	33000.4	35066.2	9913.8	10534.4	613.2	651.5	5.12	5.44	3.97	4.22	2.42	2.57	2.08	2.21
m = .75																
FAP+FSP	5412.	6191.	12071.5	13809.5	3170.8	3627.4	767.3	877.8	2.32	2.66	1.27	1.45	1.10	1.25	0.67	0.76
FSP	370.	394.	24.9	26.5	48.9	52.0	3.9	4.1	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01

Table 13C

ESTIMATED AGGREGATE IMPACT OF PROGRAM
USING THE LOWER BOUND PROCEDURE AND THE HIGH SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .25 and ϵ^y = -.11)

Simulated Programs	Number Program Participants (thousands)		Total Subsidy ($ millions)		Total Production Loss ($ millions)		Total Welfare Cost ($ millions)		Hours Reduction as a Percent of all Hours Worked by Sample Population		Production Loss as a Percent of Total Earnings of Sample Population		Hours Reduction as a Percent of All Hours Worked by Labor Force		Production Loss as a Percent of Total Earnings of Labor Force	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
PC FAP,FSP	4004.	5932.	5152.8	7633.8	2731.3	4046.5	478.0	708.2	1.89	2.80	1.09	1.62	0.89	1.32	0.57	0.85
C=$400+$300·N																
m = .5																
FAP+FSP	2316.	4127.	4250.5	7574.2	1722.9	3070.1	350.1	623.9	1.38	2.45	0.69	1.23	0.65	1.16	0.36	0.64
FSP	3409.	3865.	836.3	948.0	1006.3	1140.8	74.4	84.4	0.55	0.62	0.40	0.46	0.26	0.29	0.21	0.24
m = .25																
FAP+FSP	7457.	8531.	9672.5	11065.1	5287.9	6049.3	682.1	780.3	3.19	3.65	2.12	2.42	1.51	1.72	1.11	1.27
m = .75																
FAP+FSP	999.	2324.	2309.9	5375.8	637.4	1483.5	198.3	461.6	0.70	1.62	0.26	0.59	0.33	0.77	0.13	0.31
FSP	4723.	5403.	1638.8	1374.8	1426.1	1631.4	96.9	110.9	0.83	0.95	0.57	0.65	0.39	0.45	0.30	0.34
C=$500+$750·M																
m = .5																
FAP+FSP	9068.	10280.	22493.5	25499.6	10774.5	12214.4	2070.6	2347.3	6.26	7.09	4.31	4.89	2.95	3.34	2.26	2.55
m = .25																
FAP+FSP	13710.	14568.	35412.0	37628.8	16123.9	17133.3	1533.1	1629.1	8.25	8.77	6.46	6.86	3.89	4.13	3.38	3.59
m = .75																
FAP+FSP	5412.	6191.	14657.0	16767.2	6277.5	7181.3	1918.4	2194.6	4.37	5.00	2.51	2.88	2.06	2.36	1.32	1.51
FSP	370.	394.	36.7	39.0	111.7	118.7	9.7	10.3	0.05	0.06	0.04	0.05	0.03	0.03	0.02	0.02

Notes to Table 13A, 13B and 13C

Estimates are made for seven sets of program parameters. The first (PC) is based on the proposals of the President's Commission on Income Maintenance Programs. The remaining six combine the Family Assistance Plan (FAP) with the Food Stamp Program (FSP). The FAP tax rate (m) takes on three values, .25, .50, and .75, and the guarantee level (C) two values, \$400 + \$300 · N and \$500 + \$750 · M. The low guarantee would provide \$1600 to a family of four with no other source of income, and the high guarantee would provide \$3500 to the same family. Results for those who would participate in FSP but not FAP are presented separately. Where the FAP parameters are particularly generous (that is, where C = \$400 + \$300 · N and m = .25, or where C = \$500 + \$750 · M and m = .25 or .50), all FSP participants would also enroll in FAP.

The terms "adj." and "unadj." refer to whether or not the estimates have been adjusted for the possibility that the weighted sample used for the simulations contained too low a proportion of families at the low end of the income distribution.

Column (1) shows an estimate of the number of families headed by married males less than 62 years of age who will participate in each program.

Cols. (2), (3), and (4) show estimates of three different dimensions of the total costs associated with negative income tax programs: the total subsidy bill, the total reduction in the productive output of goods and services, and the total welfare cost resulting from the imposition of a marginal tax rate. These estimates were calculated by multiplying the average subsidy, average production loss, and the average welfare cost associated with each program by the number of program participants.

In cols. (5) and (6) the total loss in hours and in production are divided, respectively, by the total pre-program hours of work and the total earnings of all married male family heads under 62 years of age, regardless of whether they are program participants.

In cols. (7) and (8), the total loss in hours and in production are divided repsectively by the total pre-program hours of work and the total earnings of the entire labor force. The estimated total hours worked in the economy in 1966 by the total labor force was 152,684 million. The estimate was derived from the following sources: *Employment and Earnings*, U.S. Department of Labor, Bureau of Labor Statistics, Vol. 14, No. 7, January 1968; and U.S. Department of Labor, Bureau of Labor Statistics, *Special Labor Force Report No. 91* "Work Experience of the Population 1966," 1968.

The total earnings of the labor force, that is, labor's share of income, in 1966 was estimated to be \$476.5 billion. This is estimated by including compensation of employees plus two-thirds of proprieters' incomes, a fraction approximately equal to labor's share of other income. The source for this estimate was U.S. Department of Commerce, Office of Business Economics, *Survey of Current Business*, Vol. 49, No. 7, July 1969.

if necessary information was missing or if the head did not work at his usual job during the week preceding the survey.[1] As a result, aggregate estimates based only on the sample simulation would substantially understate program magnitudes. The estimates in Table 13 were all inflated to adjust for the sample undercount.[2]

Third, it is likely that families who were eliminated from the sample because of missing information or other reasons were disproportionately from the low end of the income distribution. Thus, the percentage of families in the sample who would participate in a program may be lower than the actual proportion of families with working male heads under 62 in the United States who would participate. We adjusted for this distributional difference by comparing the sample income distribution with that from the Current Population Survey.[3]

The unadjusted estimates presented in Table 13 have been inflated to reflect sample undercount, and the adjusted estimates have, in addition, been adjusted for a distributional difference. Both estimates have been presented beccause there is considerable uncertainty about the actual income distribution at relatively low incomes. If there is substantial underreporting in the Current Population Survey, the adjustment factors, which were greater than 1 but less than 2, may be too large.[4] Actual aggregate impact is almost certain to be bracketed by the two estimates.

Another point that should not be overlooked is that the estimates are based on 1966 income levels. Median family income increased by over 25 percent from 1966 to 1969, however, and there is no reason to

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[1] Complete information on the composition of the sample is provided in Appendix A.

[2] Details on this adjustment procedure are provided in Appendix A.

[3] The adjustment procedure is described in detail in Appendix A.

[4] In general, the CPS shows more families at the low end of the income distribution than the SEO. One apparent reason is that income is more likely to be underreported in the CPS than the SEO. (See Appendix A, Table A-5. Also see *A Comparison of Selected Economic and Demographic Characteristics from the 1966 and 1967 SEO's and CPS's*, pp. 18-23 and Tables 13-20.)

think that the distribution of income has changed much in the meantime. Increases in wages and prices and productivity growth have no doubt led to further growth since 1969. These changes imply that estimates of aggregate impact, particularly estimates of numbers of participants and program subsidy, are substantially larger than would be estimated from data on income for 1970 or 1971.[1] Because of the real uncertainty that exists concerning the low end of the income distribution, estimates based on it are more appropriately characterized as a range of possible outcomes. In light of the likelihood that CPS distributions reflect considerable underreporting and in view of the increase in incomes of 30 to 40 percent since 1966, however, the unadjusted estimates can be regarded as a reasonable approximation of the current (late 1970) aggregate impact of the alternative programs.

The most readily apparent aspect of the simulation results is that all of the aggregate estimates are very sensitive to the generosity of the program considered. Numbers of participants and the subsidy required increase markedly as more generous programs are considered, whether the increased generosity results from a higher guarantee level at a given tax rate or a lower tax rate at a given income guarantee level. Transfer costs -- the level of the total subsidy -- and reductions in hours of work and production are increased both because families at the low end of the distribution are more strongly affected and because the number of participants rises substantially for more generous programs.

The range of the hours of work responsiveness estimates used in the simulation does not seriously influence some of the most important aggregate estimates. Transfer costs for the Administration's proposed FAP+FSP program, for example, vary by less than 15 percent between the low and the high hours response estimates. Reductions in hours, welfare costs, and production losses, however, are proportionately much more sensitive to differences in labor supply responsiveness than transfer cost.

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[1] A small partial offset to the increase in incomes since 1966 is population growth. The population increased by about 3 percent from 1966 to 1969.

In a comparison of programs most similar in terms of total subsidy -- the low guarantee, low tax rate program and the high guarantee, high tax program -- it is apparent that a much larger impact on lower income families is achieved through a high guarantee, high tax program. For a given amount of subsidy payments, it also appears that hours reductions and production losses are smaller under a high guarantee, high tax program because participants are far fewer and have lower wages. But comparisons of this type must be treated with extreme caution. First, for extremely high tax rates estimates of hours responses are likely to be substantially less reliable and labor force participation decisions should be explicitly considered. Extreme changes in workers' net wage rates are less likely to give rise to only incremental hours reductions and more likely to give rise to complete withdrawal from the work force. Second, the analytic framework underlying the simulation procedure is essentially static, and for programs with very high tax rates, actual labor supply adjustments are likely to differ sharply from these that were estimated. Third, only families that are headed by members of the working poor are considered in the simulations. Under extremely high tax rates, there would be little incentive for families covered under current income maintenance programs to consider increasing their work effort.

The estimated impact of each of the alternative programs is reported in Table 13. For each program, six different values for each measure of program impact are presented. Three sets of estimates of substitution and income effects are used in the simulation and measures of aggregate impact are reported that have and have not been adjusted for possible distributional differences between the sample population and the actual population. In order to limit the range of the discussion, we concentrate on the unadjusted program impact estimates based on the intermediate labor response estimates. Furthermore, the combined Family Assistance Plan-Food Stamp Program with the parameters recommended by the Administration (i.e., a FAP tax rate of 50 percent and a guarantee level of $1600 for a family of four) the program of most current policy interests, will be considered in most detail.

The Administration program would apparently provide about $4 billion in transfer payments for male-headed families among the working

poor.[1] Nearly $1 billion more would be received by families who would choose to purchase food stamps but not to participate in FAP. About 2.3 million male-headed families would participate in the combined program[2] and an additional 3.4 million would purchase Food Stamps.

The loss in production resulting from FAP+FSP would total about $1.4 billion, and the $4 billion subsidy would therefore increase the total income of participants by about $2.6 billion. For families participating only in the Food Stamp Program, the loss in production would be roughly equal to the subsidy so that the two cancel out and there is no net gain in income. This suggests that offering food stamps to families who choose not to participate in FAP results in no net gain, except in increased leisure, for the participants.

Labor supply adjustments under FAP+FSP would result in a decline in hours of somewhat more than one percent for male heads of families. The production loss would be only about .6 percent of the total output produced by male family heads. These losses would entail a reduction in overall hours in the economy of about .5 percent and a reduction in output of .3 percent.

These estimates can be considered roughly applicable to a plan of this design implemented in 1970 or 1971. The range of uncertainty around these estimates can be illustrated by a comparison of ranges presented in the table. For example, transfer cost estimates that are based on the high and the low labor responsiveness estimates vary by less than 10 percent from the intermediate estimates. The hours reduction and production loss estimates vary by considerably more.

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[1]There are at least three reasons why our subsidy figures cannot be directly compared to those issued by the Nixon administration: (1) as pointed out above, our results do not cover all the potential participants in the Administration's program (e.g., female heads of households and secondary workers). (2) Administration estimates assume no reduction in work effort. A reduction in work effort reduces earnings and hence increases the size of subsidy payments. (3) The Administration's estimates are for the incremental cost of FAP. Ours are for the full cost of FAP plus food stamps.

[2]This is approximately 7 percent of all such households in the United States.

Following the procedure for obtaining an upper bound on the number of participants would increase program costs on the order of 10 percent.[1] The most important source of uncertainty over the cost of the subsidy concerns the shape of the low end of the income distribution. It appears that the range of uncertainty resulting from the absence of precise information about the income distribution might be on the order of 25 percent.

Program Impact on Average Participants

To interpret the estimated effects on "average" participating families (Table 14), it is necessary to keep in mind that the number and composition of families differ between alternative programs. Comparisons of different programs reflect the shifting populations for which the average were computed and not how a given group of families is on average affected by different programs. When lower tax rates or a higher income guarantee are considered, higher income families become eligible to participate, as is shown in Table 14, where the average earnings of the family head and pre-program family income are both substantially higher under low tax rate or high guarantee programs. Although the average subsidy obtained by low income families increases under more generous programs, small subsidies received by families eligible only for more generous programs tend to depress the overall average. Moreover, since the density of the income distribution increases with increasing incomes over the range we consider, larger numbers of families are marginally affected under more generous programs. This shifting mix of participants, which affects all of the measures reported in Table 14, obscures the impact on a given family of different programs.

One of the most prominent features of the simulation results for the Administration's FAP+FSP program is the level of average income of participating families. Family income without the program averages $3941, and earnings of the head averages $3484. An average subsidy

[1] See Appendix C.

Table 14A

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT
USING THE LOWER BOUND PROCEDURE AND THE INTERMEDIATE SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .20 and C^y = -.10)

Simulated Programs	Pre-Program Hours	Hours Reduction: Mean Hrs. Reduction	Hours Reduction: Percent Attributable to: Subs. Effect	Hours Reduction: Percent Attributable to: Income Effect	Hours Reduction: Percent Change in Hours: Economic	Hours Reduction: Percent Change in Hours: Individual	Pre-Program Earnings	Production Loss: Mean Loss in Production	Production Loss: Percent Attributable to: Subs. Effect	Production Loss: Percent Attributable to: Income Effect	Production Loss: Percent Production Loss	Welfare Cost	Pre-Program Family Income	Net Change in Family Income: Total	Net Change in Family Income: Percent With Positive Change	Annual Subsidy
PC FAP,FSP	1947.	289.	67.4	32.5	14.8	17.3	$3820.	$ 552.	67.6	32.4	14.7	96.	$4573.	665.	78.5	$1230.
C=$400+$300·N																
m = .5																
FAP+FSP	1950.	365.	62.8	37.1	18.7	22.3	3484.	518.	60.8	39.2	17.7	121.	3941.	1094.	99.4	1760.
FSP	2156.	97.	80.2	19.8	4.5	4.6	5362.	241.	79.8	20.2	4.5	17.	6092.	-7.	43.7	236.
m = .25																
FAP+FSP	2108.	264.	61.5	38.5	12.5	14.1	4930.	596.	62.7	37.3	12.1	73.	5621.	647.	78.3	1252.
m = .75																
FAP+FSP	1689.	430.	61.7	38.3	25.5	31.2	2544.	533.	53.9	46.1	20.9	159.	2968.	1525.	100.0	2213.
FSP	2154.	107.	72.7	27.3	5.0	5.1	5038.	250.	72.5	27.5	5.0	16.	5697.	87.	59.3	338.
C=$500+$750·M																
m = .5																
FAP+FSP	2134.	426.	59.0	41.0	20.0	22.0	5246.	395.	60.3	39.7	19.0	183.	6042.	1343.	88.6	2366.
m = .25																
FAP+FSP	2174.	379.	44.2	55.8	17.4	19.2	5024.	1007.	45.7	54.3	16.7	89.	7127.	1502.	90.5	2517.
m = .75																
FAP+FSP	2062.	495.	66.2	33.9	24.0	26.7	4491.	951.	66.2	33.7	21.2	284.	5121.	1479.	92.7	2540.
FSP	2222.	85.	94.8	5.2	3.8	3.8	6409.	247.	94.0	6.0	3.9	21.	7115.	-158.	2.5	88.

Table 14B

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT
USING THE LOWER BOUND PROCEDURE AND THE LOW SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .10 and C^y = -.09)

Simulated Programs	Pre-Program Hours	Hours Reduction: Mean Hrs. Reduction	Hours Reduction: Percent Attributable to: Subs. Effect	Hours Reduction: Percent Attributable to: Income Effect	Hours Reduction: Percent Change in Hours: Economic	Hours Reduction: Percent Change in Hours: Individual	Pre-Program Earnings	Production Loss: Mean Loss in Production	Production Loss: Percent Attributable to: Subs. Effect	Production Loss: Percent Attributable to: Income Effect	Production Loss: Percent Production Loss	Welfare Cost	Pre-Program Family Income	Net Change in Family Income: Total	Net Change in Family Income: Percent With Positive Change	Annual Subsidy
PC FAP,FSP	1947.	182.	53.5	46.5	9.3	11.7	$3820.	$ 360.	53.6	46.4	9.4	$48.	$4573.	769.	88.1	$1126.
C=$400+$300·N																
m = .5																
FAP+FSP	1950.	237.	48.4	51.6	12.1	15.6	3484.	335.	46.1	53.9	11.3	60.	3941.	1189.	100.0	1625.
FSP	2156.	56.	69.3	30.7	2.6	2.7	5362.	142.	68.7	31.3	2.6	9.	6092.	76.	70.9	217.
m = .25																
FAP+FSP	2108.	173.	47.0	52.9	8.2	9.7	4930.	385.	48.3	51.7	7.8	37.	5621.	775.	87.0	1170.
m = .75																
FAP+FSP	1689.	281.	47.2	52.8	16.7	22.4	2544.	340.	39.0	61.0	13.4	79.	2968.	1573.	100.0	2033.
FSP	2154.	65.	59.7	40.4	3.0	3.2	5038.	154.	59.5	40.5	3.1	8.	5697.	167.	79.0	320.
C=$500+$750·M																
m = .5																
FAP+FSP	2134.	283.	44.4	55.6	13.3	15.3	5246.	653.	45.7	54.3	12.5	91.	6042.	1486.	93.9	2160.
m = .25																
FAP+FSP	2174.	274.	30.5	69.5	12.6	14.2	5024.	723.	31.8	68.2	12.0	45.	7127.	1679.	95.3	2407.
m = .75																
FAP+FSP	2062.	315.	52.0	48.0	15.3	17.9	4491.	586.	52.0	48.0	13.0	142.	5121.	1559.	97.0	2231.
FSP	2222.	44.	91.0	9.0	2.0	2.0	5409.	132.	89.8	10.2	2.1	10.	7115.	-62.	7.5	67.

Table 14C

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT
USING THE LOWER BOUND PROCEDURE AND THE HIGH SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .25 and C^y = -.11)

Simulated Programs	Pre-Program Hours	Hours Reduction: Mean Hrs. Reduction	Hours Reduction: Percent Attributable to: Subs. Effect	Hours Reduction: Percent Attributable to: Income Effect	Hours Reduction: Percent Change in Hours: Economic	Hours Reduction: Percent Change in Hours: Individual	Pre-Program Earnings	Production Loss: Mean Loss in Production	Production Loss: Percent Attributable to: Subs. Effect	Production Loss: Percent Attributable to: Income Effect	Production Loss: Percent Production Loss	Welfare Cost	Pre-Program Family Income	Net Change in Family Income: Total	Net Change in Family Income: Percent With Positive Change	Annual Subsidy
PC FAP,FSP	1947.	347.	70.2	29.8	17.8	20.5	$3820.	$ 532.	70.4	29.6	17.9	$119.	$4573.	$608.	74.3	$1287.
C=$400+$300·N																
m = .5																
FAP+FSP	1950.	436.	65.8	34.2	22.3	26.2	3484.	744.	63.9	36.1	21.3	151.	3941.	1042.	99.4	1835.
FSP	2156.	118.	82.2	17.8	5.5	5.6	5362.	295.	81.8	18.2	5.5	22.	6092.	-51.	33.8	245.
m = .25																
FAP+FSP	2108.	314.	64.5	35.5	14.9	16.6	4930.	709.	65.7	34.3	14.4	91.	5621.	575.	73.0	1297.
m = .75																
FAP+FSP	1689.	513.	64.8	35.2	30.4	36.4	2544.	638.	57.3	42.7	25.1	199.	2968.	1499.	100.0	2313.
FSP	2154.	129.	75.1	24.9	6.0	6.2	5038.	302.	75.0	25.0	6.0	21.	5697.	44.	51.9	347.
C=$500+$750·M																
m = .5																
FAP+FSP	2134.	506.	62.1	37.9	23.7	25.9	5246.	1188.	63.4	36.6	22.7	228.	6042.	1263.	84.4	2481.
m = .25																
FAP+FSP	2174.	442.	47.4	52.6	20.3	22.1	6024.	1176.	48.9	51.1	19.5	112.	7127.	1398.	88.1	2583.
m = .75																
FAP+FSP	2062.	593.	69.0	31.0	28.7	31.5	4491.	1163.	69.2	30.8	25.8	354.	5121.	1436.	92.1	2708.
FSP	2222.	105.	95.4	4.6	4.7	4.7	5409.	302.	94.7	5.3	4.7	26.	7115.	-206.	1.0	99.

Notes to Tables 14A, 14B and 14C:

Estimates are made for seven sets of program parameters. These are described in the notes to Table 13. Two measures of the percentage reduction in hours are presented. The percentage change in hours in economic terms equals $\frac{\sum_{i=1}^{n} \Delta H_i}{\sum_{i=1}^{n} H_i}$ while in individual terms it equals $\frac{\sum_{i=1}^{n} \frac{\Delta H_i}{H_i}}{n}$,

where n is the total number of program participants. In less formal terms, the economic measure is calculated by dividing the average number of pre-program hours into the mean reduction in hours. The individual indicator is derived by first dividing each participant's initial hours into that participant's reduction in hours and then averaging. This indicator gives each individual equal weight. The first measure, on the other hand, gives greatest weight to those whose pre-program economic contribution, in terms of hours worked, is largest. Although the economic indicator is a more relevant measure of the impact of a particular program upon the economy, the individual indicator is probably the closest statistical approximation of what is implied in public speculation over how a typical recipient is likely to respond to a negative income tax and indicates the cleavage between those who receive subsidies and those who do not that is likely to develop in a work-oriented society. The individual indicator also tends to be larger than the first index because participants with low initial hours tend to receive the largest subsidy amounts and hence tend to make the greatest proportional adjustments in their labor supply. The percent production loss is presented only in economic terms. It equals

$$\frac{\sum_{i=1}^{n} \Delta H_i \cdot W_i}{\sum_{i=1}^{n} H_i \cdot W_i},$$

where n is the total number of program participants. In individual terms the present production loss is identical to the percent change in hours in individual terms; that is,

$$\frac{\sum_{i=1}^{n} \frac{\Delta H_i \cdot W_i}{H_i \cdot W_i}}{n} = \frac{\sum_{i=1}^{n} \frac{\Delta H_i}{H_i}}{n}$$

of $1760 dollars combined with a decline in earnings of about $600 leads to an average increase in income of about $1100. Evidence presented below suggests that the principal reason for the relatively high income levels, somewhat above the poverty line for a family of four, is the prevalence of relatively large families.

The estimated impact on the average family who purchases food stamps, but is not eligible for FAP, is consistent with the aggregate results. Although the average income of these families is about 50 percent higher than the average for families who also participate in FAP, the average subsidy of $236 that they receive is much less. Consequently, these families make relatively small adjustments in their labor supply. Nevertheless, the results indicate that the average family sustains a $7 loss in income and that fewer than half of these families, as compared with virtually every family participating in the Administration's FAP+FSP program, achieve a net gain in income.

Hours of work for the average male head of participating families would be reduced by about 19 percent under the Administration's FAP+FSP program. About 2/3 of the hours reduction would be attributable to the substitution effect with the remainder resulting from the income effect.

Both the estimates for the average participating family and the aggregate estimates indicate that out of each dollar of income subsidy under the Administration's proposed program, about 35 cents is taken out for increased leisure. It might seem surprising that families at the low end of the income distribution would place so high a value on increased leisure, but it should be recognized that the program gives rise to a very substantial change in incentives. On the basis of these results it seems clear that a restructuring of the welfare system along the lines of the proposed program could also significantly affect the work patterns of families currently receiving welfare. Reductions in work effort in response to a negative income tax program will introduce some cleavage between participating families and non-participants. But this cleavage will be offset, at least in part, by

a reduction in the cleavage between the working poor and those in poor families who do not find it advantageous to work under current welfare programs.

Program Impact by Selected Characteristics of Participants

The estimates presented up to this point are applicable to male-headed families of the working poor as a group. Table 15 presents estimates of the impact of selected programs on selected demographic sub-groups. The estimates reported there permit comparisons of hours reductions and production losses applicable to each group as well as comparison of the percent of the total subsidy each receives. These estimates were developed using the intermediate estimates of labor supply responsiveness for the Administration's FAP+FSP program, the Food Stamp Program applicable to those not participating in FAP, and the President's Commission program.

The estimates indicate that under the FAP+FSP program, the hours reduction of Negro married male family heads under 62, as a percent of total hours worked by both participants and non-participants in that group, would be nearly 5 percent compared with less than 1 percent for whites. This differential does not arise because Negroes are more responsive to work incentives than whites; the same labor responsiveness estimates were used for both groups in the simulation because there was no convincing evidence of a significant difference by color. The difference in percentage hours reductions instead reflects the fact that incomes of Negro families are disproportionately low, and as a consequence they are more likely than white families to qualify for a negative income tax program. Other demographic groups with relatively large reductions in work effort are families who live in the South Census Region, families who live in rural areas, and families with six or more members. The first two groups, like Negro families, have disproportionately low incomes. For the third group, large families, the size of the subsidy, and hence the size of the income effect, is positively related to size of the family. Production losses, reflecting the impact of both hours reductions and low wages, are much smaller in percentage terms but follow a pattern similar to that of hours reductions.

Table 15

THE ESTIMATED IMPACT OF SELECTED PROGRAMS ON SELECTED DEMOGRAPHIC GROUPS USING THE LOWER BOUND PROCEDURE AND THE INTERMEDIATE SUBSTITUTION AND INCOME EFFECT ESTIMATES (ϵ^S = .20 and C^Y = -.10)
(percent)

Demographic Group	Hours Reduction as a Percentage of All Hours Worked by Demographic Group			Production Loss as a Percentage of Total Earnings of Demographic Group			Percentage of Total Subsidy Received by Demographic Group		
	FAP+FSP	FSP	PC	FAP+FSP	FSP	PC	FAP+FSP	FSP	PC
Total	1.1520	0.4507	1.5752	0.6153	0.3311	0.9065	100.0000	100.0000	100.0000
Race									
White	0.8401	0.4221	1.2054	0.4290	0.3052	0.7069	62.4915	82.4719	64.5602
Black	4.8613	0.8061	5.9360	3.0448	0.7843	4.3015	36.1407	16.5347	33.7439
Other	1.6487	0.3505	2.4999	0.8110	0.3176	1.4699	1.3686	0.9891	1.6999
Census Region									
Northeast	0.6824	0.4210	1.0465	0.3920	0.3184	0.6899	14.7517	22.7755	16.8425
North central	0.8079	0.4419	1.1161	0.4452	0.3352	0.7133	19.5137	30.5676	19.8082
South	2.2132	0.5385	2.8449	1.0832	0.3941	1.5761	54.9933	32.7171	52.0050
West	0.6960	0.3628	1.0628	0.3463	0.2579	0.6227	10.7464	13.9409	11.3553
Extent of Urbanization									
Small cities and towns	1.3934	0.4422	1.8591	0.6970	0.3518	1.1270	14.4211	14.2034	14.4265
Rural areas	2.5116	0.6575	3.1756	1.3306	0.5697	1.9379	34.4878	28.0839	33.3802
Suburbs of SMSAs with 250,000 or or more inhabitants	0.5351	0.3588	0.8084	0.2604	0.2496	0.4657	20.0873	33.1372	20.5306
Central cities of SMSAs with 250,000 or more inhabitants	1.1542	0.4684	1.6364	0.6962	0.3491	1.0787	31.0067	30.3567	31.6729
Age									
14 to 25 years	0.9317	0.4150	1.5285	0.6002	0.3365	1.1260	5.7325	5.5646	6.3319
25 to 55 years	1.2737	0.4938	1.7097	0.6297	0.3619	0.9807	90.1442	89.9700	89.3856
55 to 62 years	0.4227	0.1645	0.6320	0.1538	0.1094	0.2671	4.1222	4.4611	4.2468
Size of Family									
2 persons	0	0	0.2925	0.0000	0	0.1238	0	0	1.9272
3 persons	0.3347	0.1766	0.4897	0.1409	0.1000	0.2370	4.6814	5.7821	4.8670
4 persons	0.6331	0.3639	0.8224	0.2657	0.2265	0.3927	11.1057	16.0588	10.2581
5 persons	0.9640	0.6836	1.4688	0.4535	0.4619	0.8113	13.4433	22.8628	13.7342
6 or 7 persons	2.7521	1.0445	3.6544	1.3596	0.8397	2.1819	31.5806	37.2194	31.6219
8 or 9 persons	6.3352	1.2515	8.0442	3.6559	1.1590	5.4036	21.7319	13.7585	21.7576
9 or more persons	14.7611	1.1949	16.3652	10.2375	1.4072	13.0067	17.5367	4.3266	15.8112
Total Family Income									
Under $1000	7.2607	1.5606	13.7614	4.0567	0.9591	9.7453	0.9288	0.3059	1.1846
$1001 to $2000	12.1221	0	15.8797	8.6550	0	11.4026	12.5331	0	5.2117
$2001 to $3000	11.6566	0.3056	13.0337	9.8427	0.4092	11.8117	13.6685	0.7980	11.6244
$3001 to $4000	8.8058	0.5592	9.7171	7.7254	0.5569	9.3940	21.4004	2.9380	19.4434
over $4000	0.7097	0.4498	1.0828	0.3955	0.3275	0.6921	58.4630	95.9590	62.5363

Notes:
Estimates are made for two sets of program parameters. The first is the FAP,FSP program that uses the Administration's parameters (that is, the FAP tax rate, m, equals .50 and the FAP guarantee level, C, equals $400 + $300 · N). Results for those who would participate in FSP but not FAP are presented separately from the estimates for those who would participate in both FAP and FSP. Estimates are also made for the program based on the proposals of the President's Commission on Income Maintenance Programs (PC). The estimates are not adjusted for possible biases in the income distribution associated with the sample population.

The estimates of the percentage of the total subsidy received by each demographic group are particularly interesting. White families receive 62 percent of the total FAP+FSP subsidy compared with 36 percent for black families. One of the most striking figures among these estimates is that 55 percent of the subsidy would go to families in the South Census Region. Over one-third of the subsidy would go to rural areas, a slightly larger fraction than would be received by residents of the central cities of large SMSAs, which include the large urban ghettos.

Large families would receive a very large share of the total subsidy according to these estimates. Although a "typical family of four" is often used to illustrate the operation of negative income tax programs, only 16 percent of the subsidy under FAP+FSP would go to families with 4 or fewer persons. Families with 6 or more persons, on the other hand, would receive 71 percent of the subsidy. These estimates suggest that family of four is quite atypical in terms of the major beneficiaries of the program.[1]

Although average income for families participating in the program was slightly less than $4000, 58 percent of the subsidy would be received by families with incomes over $4000. This difference reflects the tendency for large families to receive a large share of the subsidy, and it also provides an explanation of why the average income of participating families is relatively high in comparison with the poverty line for a family of four. It has already been pointed out that the food stamp program for families not eligible for FAP is estimated to result in no net gains in income. These estimates of how the FSP subsidy is divided among income classes show, in addition, that 96 percent of the subsidy accrues to families with incomes over $4000.

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[1] That families participating in FAP+FSP tend to be relatively large is indicated by the following breakdown:

Family Size	Percentage of All Participating Families
3 or 4 persons	25.8
5 persons	16.1
6 or more persons	58.1

VII. CONCLUSIONS

This Report presents an analysis of work incentives and their influence under alternative income maintenance programs. Existing data were used to obtain estimates of the relationship between wage and income changes and hours of work. These estimates then were used in a simulation of the costs, the impact on incomes, and the changes in work patterns that might result from the extension to the working poor of income maintenance programs incorporating negative income tax principles, such as the Family Assistance Plan proposed by the present Administration. Although the study is limited to male-headed families and incorporates only the hours of work response of the heads, it does take into account a major component of adjustments in work patterns and in earnings of the working poor. This group is of particular interest because extension of income supplements to them represents one of the major new departures of proposed programs.

Estimates of the labor supply response to variations in the family head's wage rate, net of taxes, and in family income were obtained by measuring the differences in annual hours of labor supplied by workers with different wages and different levels of non-employment income. The analysis is based on the assumption that information on the systematic relation between work choices and differences in wage rates and income levels can be used to infer the response of a typical worker faced with changes in these variables similar to the differences observed. The analysis was based on a national sample of approximately 6,000 households, headed by married males under 62 years old, drawn from the 1967 Survey of Economic Opportunity file. The labor supply response parameters were estimated by regression techniques.

In addition to the wage rate and non-employment income, a number of other variables were incorporated into the analysis to attempt to control for other differences between workers. We regard our attempt to control for the influence of different preferences for assets on the observed relationship between non-employment income and work choices as the major innovation in the study, and the evidence indicates that

it has enabled us to obtain more reliable labor response estimates than those obtained in earlier studies.

Estimates of the effects of changes in the wage rate and in non-employment income on hours of work varied between different demographic subgroups of the sample, although they showed a tolerable degree of consistency between major subgroups. They also varied somewhat depending on the precise functional form and construction of variables. In particular, it appeared that the coefficient for non-employment is sensitive to the manner in which the variable is defined and constructed.

On the basis of the obtained evidence and our judgment of the most likely character of biases in the estimates, three sets of supply parameters were selected to use in analyzing labor supply responses to alternative income maintenance programs: high and low estimates that represented the maximum and minimum response that could be inferred from the overall evidence, and an intermediate set of estimates that we believe most closely approximated the actual response. The pairs of estimates selected were:

	Substitution Effect (Elasticity)	Income Effect (Slope Coefficient)
Low estimate	.10	-.09
Intermediate estimate	.20	-.10
High estimate	.25	-.11

The labor supply parameters were used to simulate the impacts of several alternative negative income tax programs. From the perspective of immediate policy implications, the most interesting results are for a combined Family Assistance Plan and Food Stamp Program (FAP+FSP), the heart of the Administration's recommended changes to the current welfare system. On the basis of the intermediate set of labor response estimates, it appears that about 2.3 million families that are headed by males under 62 years of age would participate in FAP+FSP. These families would receive around $4 billion in transfer payments. About a third of this subsidy would go to residents of the central cities of urban areas with at least a quarter of a million inhabitants and over another third of the subsidy to rural areas.

More than half would be received by families in the South Census Region. Families headed by whites would receive about 62 percent of the total transfer payments under FAP+FSP, while those headed by Negroes would receive about 36 percent. Rather surprisingly, more than half of the benefits would go to families whose pre-program income exceeded $4000 and more than two-thirds to families with 6 or more persons.

Some of the $4 billion subsidy would, in effect, be used to purchase leisure. Thus, earnings of the family heads, a measure of the market value of the goods and services they produce, would decline by about $1.4 billion. As a result, family income of participating families increases by only $2.6 billion, rather than by the full $4 billion in transfer payments. In contrast to these results, our estimates indicate that families who are eligible for food stamps, but who do not qualify for the combined FAP+FSP program would reduce their earnings by roughly the amount of the food stamp subsidy. The net result for them would be an increase in leisure but no increase in income.

Some summary measures of the impact of FAP+FSP and two of the six additional programs that we investigated are presented below:

	FAP+FSP	High Tax Rate-High Guarantee Program	Low Tax Rate-Low Guarantee Program
Number of participating families (thousands)	2,316	5,912	7,457
Total program subsidy cost ($ millions)	4,077	13,748	9,336
Total pre-program income of participating families ($ millions)	9,127	27,715	41,916
Net change in income of participating families ($ millions)	2,647	8,601	4,889
Total loss in production (reduction in head's earnings) ($ millions)	1,430	5,147	4,447

Source:
Table 13A.

It is apparent that the largest impact on lower income families is achieved with the high guarantee-high tax program. On the other hand,

this program is the most costly, in terms of both direct subsidy cost and production loss. Note, however, that although the high tax rate-high guarantee level program provides transfer payments to the poor that are 47 percent higher than those provided by the low tax rate-low guarantee level program, the loss in production that it causes is only 16 percent higher. This is because it covers fewer participants and those that it does cover tend to have lower wage rates.

Some measures that attempt to place the hours reductions and production losses associated with FAP+FSP and the two alternative programs into economic perspective are reported below:

	FAP+FSP	High Tax Rate-High Guarantee Level Program	Low Tax Rate-Low Guarantee Level Program
Total program subsidy cost ($ millions)	4,077	13,748	9,336
Total reduction in hours as a percentage of pre-program hours worked by			
a. Married male heads of participating families	18.7	24.0	12.5
b. Married male heads of participating and non-participating families	1.2	3.7	2.7
c. Total labor force	0.5	1.7	1.3
Total production loss as a percentage of pre-program earnings of			
a. Married male heads of participating families	17.7	21.2	12.1
b. Married male heads of participating and non-participating families	0.6	2.1	1.8
c. Total labor force	0.3	1.1	0.9

Source: Tables 13A and 14A.

Male heads of families participating in FAP+FSP would reduce their labor supply by around 19 percent. This decline in hours would reduce the total hours worked by *all* married male family heads under 62 years of age by somewhat more than 1 percent. In terms of the output produced by such persons, the reduction is about .6 percent. Hours worked by the entire labor force would be reduced by about one-half of 1 percent and labor's contribution to national output by about three-tenths of 1 percent.

Appendix A

TECHNICAL DISCUSSION

THE DATA

The data underlying this study were taken from the 1967 Survey of Economic Opportunity (SEO). The SEO sample consists of over 27,000 interview-units and is made up of two parts. The first, about 60 percent of the total sample, is a national self-weighting sample designed the same way as the 1966 Current Population Survey (CPS) but about half the size. The second sample was drawn from areas with large concentrations of nonwhites. The reason for the supplementary sample was to increase the reliability of estimates of the characteristics of the poor nonwhite population, a group that is typically underrepresented in regular census enumerations.[1]

From the perspective of a study of the effects of a negative income tax on the work incentives of the poor, the SEO file has several distinct advantages over the CPS file:

1. Nonwhites in poor areas are oversampled. The SEO provides somewhat better estimates for nonwhites than the CPS.

2. A more accurate measure of hourly wages can be obtained. Using the SEO file, hourly wages, W, are calculated from the formula, $W_{SEO} = \frac{EW}{HW}$, where EW and HW are earnings and hours, respectively, during the week previous to the survey. EW is not obtained by the CPS. Thus, W is calculated from the formula, $W_{CPS} = \frac{EY}{WY \cdot HW}$, where EY and WY are earnings and weeks of work, respectively, during the year preceding the survey year. WY is recorded for rather wide intervals (for example, 1-13 weeks, 14-26 weeks, and so on).

3. The SEO offers greater internal consistency. SEO interviewees were asked all survey questions during a single interview. During the

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[1] As an experiment, the two sampled groups were run in two separate regressions. The results (see regressions 7 and 8, Tables B-3 and B-5) are reasonably similar, especially when the flow measure of nonemployment income is used.

CPS, the work experience questions and the income questions are asked in two successive months. This may result in inconsistencies, especially if two different family members are interviewed.

4. The SEO made a detailed inquiry into asset holdings and liabilities. The CPS does not provide direct information on family asset and liability structures.

THE SAMPLE USED IN THE REGRESSIONS

The analysis of labor supply was concentrated on one important demographic group in the 1967 SEO file: married males with wives present. The men selected were less than 62 years old and headed households with incomes that did not exceed $15,000 in 1966. (For purposes of comparison several regressions were run with unrelated males in the same age-income class.) We chose to work with this particular sample because it is relatively homogeneous, the model was applicable to this group in a reasonably straightforward fashion, and of all the potential recipients of income supplements, policy makers and the public are certainly most concerned with the work responses of men with family responsibilities. Most of the other groups covered by most proposed negative income tax plans already receive some income maintenance benefits. This is the major group to whom such benefits will be extended for the first time. It is the labor supply response of this group to a negative income tax that potentially could be most damaging to the national economy.

It was necessary to restrict the sample of married men (and the sample of unrelated males) in six additional ways (see Table A-1).

(1) Missing information. Cases where the data necessary to construct one or more of the variables was unavailable were dropped from the sample. The dominant source of unobtainable information was the failure or inability of many interviewees to answer all of the detailed questions on assets and liabilities. A few additional observations were removed from the sample because the question as to whether the husband's health affects his ability to work was unanswered. Fortunately, many items were not missing because the Census Bureau

Table A-1

DERIVATION OF THE WORKING SAMPLE
(Each succeeding number refers to the remaining observations after the indicated restriction has been applied to the sample)

Interview units in 1967 SEO file	27,337
Married male household heads, 61 years old or less, wife present, interview units income in 1966 was less than or equal to $15,000	13,363
No missing information	10,134
Civilians at time of survey	9,891
Civilians with work experience in 1966	9,543
Wage rates available	7,923
Non-recipients in 1966 of public welfare, unemployment compensation, or veterans' pensions or compensation	7,093
Worked at normal job week previous to survey	6,044

provided imputed amounts when a question was unanswered. For example, an amount was imputed to all the income items that were originally in the "don't know" or "no answer" categories.[1] When the data necessary to construct a variable were imputed, the effected observations were left in the sample.[2]

(2) Participation in the Armed Forces. Information was not collected on the hours or weeks worked or the wage rates of members of the Armed Forces. The sample was therefore restricted to those who were civilians at the time of the survey.

(3) Work Experience. Only those who worked in 1966 were included in the sample. This restriction is of considerable importance. It excludes men whose labor supply was zero from our range of observation. Therefore, we could not directly measure the extent to which a negative income tax results in a complete withdrawal from the labor force.

The restriction can be justified on two grounds. First, wage rates are not available for 315 of the 348 men without work experience in 1966. Second, and more fundamentally, in only a minority of these cases does the actual labor supply, as opposed to the measured labor supply, appear to be zero. This is indicated by the reasons given for not working:

could not find work	14
ill, disabled, unable to work	250
going to school	24
in Armed Forces all of 1966 (but not at time of survey)	19
retired	27
Other	14

[1] The basic imputation method was to assign an amount to a person or interview unit commensurate with its demographic characteristics, for example, a person not reporting income from interest was assigned the average interest income of those with the same age, race, sex, educational attainment and work status.

[2] As a check regressions were run with these observations omitted. This resulted in only minor changes in the regression coefficients. (See Table B-3, regression 36).

It is clear that in 1966 only a few married men under 62 years old voluntarily withdrew from the labor force.[1] Thus, even if wage rates were available for the zero labor supply group, the cell is too small to be statistically dependable. Whether this cell would increase significantly upon introduction of a negative income tax is, of course, uncertain, but there is little potential for developing evidence on that question from these data.

(4) Wage rates. After elimination of those without work experience in 1966, 9,543 cases remained in our sample. Wage rates were not available for an additional 1,620 cases. Most of these observations fell into two groups: (a) The self-employed in their own business, professional practice, or farm. These men (about 40 percent of the 1,620) were not asked the necessary questions. (b) Those who did not work during the survey week (over 50 percent). The remaining persons (less than 10 percent) did not answer the necessary questions.

(5) Work on income conditioned income supplements. Conditional income supplements include three income categories: unemployment compensation, public welfare, and veterans' pensions or compensation.[2] Recipients of such income are subject to implicit tax rates that the rest of the population is not. Since it is not possible to control statistically for the extent to which these tax rates influence their labor supply, these cases were excluded from the sample. (Similarly, family heads who were 62 years old or older, many of whom are eligible for income conditioned Social Security, were not included in the sample.)

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[1] Undoubtedly there are some malingerers among those who claim they were too ill or disabled to work, but there is reason to believe that most were legitimately disabled. In its 1966 survey of disability, the Social Security Administration found that about 3.6 percent of the almost 50 million males between 18 and 64 years old were "severely disabled" and were not working at all at the time of the survey (Lawrence D. Haber, "Disability, Work and Income Maintenance: Prevalence of Disability, 1966," Social Security Bulletin, May 1968, Table 3.) Less then 3 percent of our sample of married males claimed to be similarly disabled and did not work during 1966.

[2] Veteran's pensions are not military retirement pensions. They are nonservice-connected disability payments to disabled veterans (or their survivors) with incomes less than an amount specified by law. Veteran's compensation payments are for service-connected disability.

(6) Reliability of reported wage and hour data. Respondents to the SEO survey were asked to name the employer for whom they worked the longest in 1966 and the kind of work that they performed for him. Those who were working for a different employer or at a different kind of work one week previous to being surveyed in February 1967 were dropped from the sample.[1] This restriction was imposed to exclude those who reported wages or hours that were atypical of their normal situation.[2]

THE SAMPLE USED IN THE SIMULATION

The sample used in the simulations differed in three respects from the sample used in the regressions. First, the $15,000 income limit on the sample was removed. High income families were excluded from the regression sample so that the coefficient estimates would not be affected by relatively few extreme observations. Once the coefficients were estimated, however, there was no reason to retain this restriction on the sample.

Second, much of the asset and liability data that was necessary for the regressions was not needed for the simulations. Thus, fewer cases were eliminated because of missing information.

Third, recipients of unemployment compensation were included in the simulation sample. It was assumed that any income received under this program was taxable nonemployment income under our simulated negative income tax programs.[3]

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[1] Several regressions were run that did include this group of observations. (See Table B-3, Regression 1.) Their inclusion does not appreciably affect the results.

[2] The following instruction to the SEO interviewers may have also helped in this respect: "If there was something unusual about last week's work such as overtime rates paid or reduced rates paid, try to obtain the normal weekly pay rate. If the normal weekly pay rate cannot be obtained for those cases, record the actual pay rate for last week."

[3] The most appropriate way of treating public welfare and veterans' pensions receipts is much less certain. Thus, families who received such income were excluded from both samples.

THE VARIABLES

The variables that appear in the model are listed in Table A-2. The subscript h indicates that the variable refers to the head of the interview unit, s to his spouse, o to interview unit members other than the head or his spouse and f to the entire interview unit. All the variables but those that involve income, earnings, wages, and labor supply refer to the interview unit's or individual's status at the time of the interview (February 1967). The income and earnings variables pertain to annual receipts during 1966.[1]

The variables that are footnoted in Table A-2 are more complex than the others and are more fully described below. The variables and constants that are used in the construction of these variables are listed in Table A-3.

(1) Labor Supply (L_h). This variable was calculated from the following formula,

$$L_h = WY_h \cdot HW_h .$$

WY_h refers to the number of weeks in the labor force during 1966;[2] HW_h pertains to the number of hours worked during the week preceding the interview. The interview took place in February 1967. Since the sample was restricted to men who worked at the same job in February 1967 as they did for most of 1966,[3] computation of L_h from information on two different time periods should not result in any substantial inconsistencies between actual and estimated hours.

(2) Asset Holdings (M_f). Ideally, this variable would measure the value of assets accumulation resulting solely from the past work efforts of the head of the household. Unfortunately, there is no way

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[1] The time periods covered by the wage and labor supply variables are discussed below.

[2] WY_h is reported for the following intervals: 1 to 13 weeks, 14 to 26 weeks, 27 to 39 weeks, 40 to 47 weeks, 48 to 49 weeks, and 50 to 52 weeks. To calculate L_h, the midpoints of these intervals were used.

[3] See the section of this appendix on the sample.

Table A-2

VARIABLES USED IN THE MODEL

L_h	Labor supply[a]
M_f	Asset holdings[a]
W_h	Hourly wage[a]
W_h^2	Hourly wage squared
W_h^o	Wage dummy, equals W_h, if W_h > \$2.00, otherwise equals 0
Y_f^a	Non-earned income, accruals[a]
Y_f^f	Non-earned income, flows[a]
P_h	Measure of relative preference for asset accumulation[b]
E_s	Earnings of spouse
E_o	Earnings of interview unit members other than head and spouse
A_h	Age
A_h^2	Age squared
D_h	Number of dependents, number of interview unit members excluding head and spouse
R_h	Race, equals 1 if nonwhite, 0 if white
S_h	Highest grade of school completed
K_h	Health, equals 1 if health limits ability to work, otherwise 0

Notes:

[a]For full explanation of variable, see text of Appendix A.

[b]Construction of this variable is fully described in Parts III and IV of the main text.

Table A-3

VARIABLES AND CONSTANTS USED IN THE CONSTRUCTION OF THE COMPLEX VARIABLES IN TABLE A-2

WY_h	Number of weeks in the labor force per year
HW_h	Number of hours worked per week
EW_h	Pre-deduction earnings per week
r	Rate of return
HV_f	Market value of (own) home
HD_f	Debt owed on home
HY_f	Imputed rental income from home
RV_f	Market value of real estate holdings (other than own home)
RD_f	Debt owed on real estate holdings
RY_f	Imputed income from real estate holdings
RT_f	Actual rental income receipts
CV_f	Market value of vehicles
CD_f	Debt owed on vehicles
CY_f	Imputed rental income from vehicles
BV_f	Market value of business and/or farm
BD_f	Debts owed by business and/or farm
BY_f	Imputed income from business and/or farm
LV_f	Money in bank accounts, credit unions, bonds, government bonds, stocks, etc.
LY_f	Imputed income from money in bank accounts, stocks, etc.
ID_f	Actual interest and dividend income
DT_f	Other debts (e.g., debts owed stores, utility companies, doctors, hospitals, banks and lending institutions)
PY_f	Monthly payments against DT_f

DY_f	Imputed (negative) income from other debts
TR_f	Direct transfer payment receipts (e.g., social security, pensions, annuities, royalties, private welfare, alimony, Armed Forces allotments)
H_h	Annual hours actually worked
$\hat{M}_f$	Predicted earned assets of family given the head's age and wage

to net out of an interview unit's net worth that part due to the work efforts of other family members, inheritance, exceptionally good or poor portfolio selection, and an exceptionally high or low propensity to save one's earnings. Thus, our measure of earned assets is simply each interview unit's net worth, that is, the difference between its assets and its liabilities.[1]

(3) Hourly Wage (W_h). This variable is calculated from the formula,

$$W_h = \frac{EW_h}{HW_h}$$

This measure of wages is based upon earnings and hours worked during the week preceding the survey interview. As explained in the section of this appendix on the data, this measure of wages is superior to most available alternatives. Nevertheless, it is possible that, for some men in our sample, wages during this particular week were unrepresentative of their usual hourly remuneration. Note that HW_h appears as a multiplicand in constructing L_h and is a denominator in W_h. Any errors in the measurement of HW_h, therefore, will negatively bias the coefficient when W_h is regressed against L_h.

(4) Non-earned income (Y_f). Most studies of the effects of income on the supply of labor have substantially underestimated non-earned income. The only measure that is usually available is income received as cash. This ignores the rental value of the home and other durable goods that a family may own. It also ignores appreciations in the market value of assets, such as land or stock, that are frequently not fully reflected in income flows as rents or dividends. If non-employment income is to be accurately measured the missing and understated amounts must be imputed. These amounts can be approximated by employing the detailed information on asset holdings provided by the SEO file together with an estimate of the rate of return, r, from these holdings.

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[1] Medical debt, a capricious item having little to do with past work effort, was not included as a liability for the purpose of calculating M_f.

In our calculations, we use a single value for r of 8 percent. In practice, of course, that rate of return may vary considerably between types of asset holdings. Capital markets are imperfect. Risk varies between assets. Some assets are more liquid than others. And lumpiness precludes many persons from purchasing certain assets (for example, one may deposit a dollar in a savings account, but to buy a home one must usually manage a rather substantial down payment). However, any attempt to make an appropriate adjustment of r between assets in order to account for all these factors would involve such a degree of arbitrariness that the consistent use of a single value for r seems most defensible. The value we chose might be viewed as an approximation of the average rate of return from all assets.

Two different versions of non-employment income were calculated. These are based upon two different views of how non-earned income is perceived by the worker. To illustrate the two approaches, let us look at a hypothetical worker who owns an acre of land. His average annual return from the land will equal r times his equity in the land. Part of this amount, however, may be received annually as rent and the remainder -- capital gains perhaps -- realized when the land is sold. According to our first approach, the worker adjusts his labor supply to the income that is accrued during the year, no matter when this income enters his cash stream. If he wishes, he could immediately realize his annual return by selling off part of his land. The fact that he does not choose to do so is irrelevant to his work-leisure choice. Our second non-earned income variant is based on the premise that a worker's current labor supply is adjusted to his current, non-transitory, cash income stream. Until his land is sold, only the rents that he receives during the year are germane to his supply decision. Upon selling his land, he may take an extended vacation.[1]

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[1]It may appear, from our example, that under the second approach imputed income need not be added to reported non-earned income. That, however, is not quite accurate. The home owner's annual income, for example, exceeds the home renter's, approximately, by the amount of rent (less maintenance cost) that he does not have to pay.

While an approach based on the second premise does have considerable plausibility, the non-employment income variant that it suggest is considerably more difficult to calculate from the information available in the SEO file than the first. The first variant, Y_f^a, is calculated from the following formula:

$$Y_f^a = HY_f^a + (RY_f^a \text{ or } RT_f) + CY_f^a + BY_f^a + (LY_f^a \text{ or } ID_f) - DY_f^a + TR_f,$$

where

$$HY_f^a = r\,(HV_f - HD_f)\ ,$$

$$RY_f^a = r\,(RV_f - RD_f)\ ,$$

$$CY_f^a = r\,(CV_f - CD_f)\ ,$$

$$BY_f^a = r\,(BV_f - BD_f)\ ,$$

$$LY_f^a = rLV_f^a\ , \text{ and}$$

$$DY_f^a = rDT_f \quad \text{and where the larger of the values enclosed by parentheses is used.}$$

Although we would generally expect the imputed return from real estate holdings (RY_f^a) and from money in banks, stock, and so on (LY_f^a) to exceed actual receipts during the year (RT_f and ID_f, respectively), the opposite may occur in some cases. In these cases actual receipts, rather than imputed income, would appear a better measure of the return during the year from these assets. Since a family's total liabilities may exceed the value of its assets, it is possible for $Y_f^a < 0$.

The second variant of non-earned income, Y_f^f, is found from the following definition:

$$Y_f^f = HY_f^f + RY_f^f + CY_f^f + ID_f - DY_f^f + TR_f + BY_f^f\ ,$$

where

$$HY_f^f = r \cdot HV_f, \text{ if } HD_f = 0 \quad \text{and} \quad HY_f^f = .20 \cdot r \cdot HV_f, \text{ if } HD_f > 0\ ,$$

$$RY_f^f = \left(\frac{RV_f - RD_f}{RV_f}\right) \cdot RT_f\ ,$$

$$CY_f^f = r \cdot CV_f \cdot \left(\frac{CV_f - CD_f}{CV_f}\right) = r \cdot (CV_f - CD_f)\ ,$$

$DY_f^f = 12 \cdot r \cdot PY_f$ and

$BY_f^f = 0$

The reasoning behind some of the calculations involved in computing Y_f^f may not be readily apparent, and for that reason will be discussed at some length.

Imputed rental income from home (HY_f^f). If housing and rental markets are operating perfectly, the annual rental value of a house will equal $r \cdot HV_f$, plus an amount sufficient to cover expected maintenance; and HV_f at the time of purchase will equal the down payment on the house, plus the appropriately discounted sum of the monthly payments for which the purchaser is obligated. Let us compare the annual cash income of a renter of a house with that of a family buying the same house and to that of the clear and free owner of the house. The renter must pay out the entire rental value of the house. The buyer, however, must only make his monthly payment and cover any maintenance costs. His income, from this particular asset, therefore, exceeds the renter's by r times the amount of the down payment.[1] For the purposes of the calculation of HY_f^f, we assume that down payments equal 20 percent of HV_f. The only outflow facing the home owner with no mortgage payments is maintenance costs. Thus, his income exceeds the renter's by $r \cdot HV_f$.

Imputed Income from Real Estate Holdings (RY_f^f). Owners of real estate receive a gross addition to their cash incomes equal to RT_f. However, unless the asset is completely paid for, they usually have a contractual obligation to make periodic payments against their debt. Thus, the situation is analogous to a purchase of a home. In this case, however, there do not appear to be any reasonable assumptions we can make about amounts of down payments. In addition, a family may have several real estate holdings, some of which are wholly owned and others that are not. To calculate RY_f^f, therefore, we assume that net income receipts increase continuously at the same rate as the family's

[1] The renter, of course, may invest the amount of the down payment in some other asset. Thus, his total non-employment income may be equal to the home buyer's.

equity in real estate increases, rather than discontinuously at the time RD_f equals zero.[1]

Imputed Rental Income from Vehicles (CY_f^f). The same procedure used to calculate RY_f^f is used to calculate CY_f^f. In this case, however, the SEO file does not provide a direct measure, such as RT_f, of the rental value of the vehicles owned by a family. This value is assumed to equal $r \cdot CV_f$.

Imputed Negative Income from Other Debts (DY_f^f). Respondents to the survey were asked what the size of their payments against DT_f were during the month preceding the survey. Their gross annual cash outflow against DT_f was assumed to equal 12 times their monthly payments ($12 \cdot PY_f$).[2] Many families, however may augment their current cash income by constantly incurring more debts of this kind. We have no information on how DT_f changes over time for the families in our sample. We assume that on the average and in the short run it remains approximately constant. Thus, the net outflow of cash income is that part of PY_f applied to interest rather than to principal.

Imputed Income from Business and/or Farm (BY_f^f). In calculating Y_f^f, we assume that $BY_f^f = 0$. Primarily, this is because we lack sufficient information to separate the return to a business or farm's physical assets from the return to the owner's human capital. That is, when a man operates his own business, it is unclear where non-earned income (his return to equity) ends, and wages (his return for current physical effort) begins.[3]

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[1] Strictly speaking, this approach would only be accurate if real estate were purchased in separate parcels that were completely paid for during the calendar year in which they were acquired.

[2] Interestingly, the means of DT_f and $12 \cdot PY_f$ are practically equal for our sample.

[3] Since we have excluded those who did not report a weekly wage from our sample, and this group includes most of the farmers and non-salaried businessmen who were interviewed during the SEO, our estimates are not very sensitive to our handling of non-earned income from businesses and farms.

CONSTRUCTION OF THE INFLATORS

In the discussion of the aggregate results presented in Table A-1, it was noted that the measures that could be directly obtained from the simulation would seriously underestimate the number of program participants for two reasons. (1) Because observations were dropped from the sample for various reasons, the absolute number of civilian married male family heads under 62 years of age and with work experience in 1966 that were represented by the weighted sample used in the simulation is less than the actual number of such persons in the United States. (2) Because the observations that were dropped from the sample were not random with respect to income, the proportion of civilian married male family heads under 62 years of age and with work experience in 1966 in the sample who qualified for benefits under a given program is probably less than the actual proportion of such persons in the United States in 1966 who would have qualified.

We shall first describe the inflators that were used to correct for the first source of bias.[1] To obtain the number of participants in a given program, the "raw" number of participants obtained directly from the simulation was multiplied by the following ratio:

$$\alpha = \frac{\text{Total number of married males in March 1967 with wives present, 16 through 61 years of age, who worked in 1966, excluding those in the Armed Forces}^{2}}{\text{Total number of family heads represented by the weighted simulation sample}} = \frac{33,434,000}{18,144,000}$$

To calculate the total hours reduction resulting from a given program, the average reduction (from Table 14, column 2) was multiplied by the following ratio:

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[1] The "unadjusted" results presented in Table 13 are only corrected for (1), while the "adjusted" figured are corrected for both (1) and (2).

[2] This number was estimated from United States Bureau of the Census, "Current Population Reports," Series P-60, Nos. 53, 59, and 64; and from a mimeographed descriptive appendix to the SEO file entitled "A Comparison of Selected Economic Characteristics from the 1966 and 1967 SEO's and the Comparable CPS's."

$$\beta = \alpha \cdot \frac{\text{Average annual hours of work in 1966 of married males with wives present, 16 through 64 years of age, excluding those in the Armed Forces}^{1}}{\text{Average annual hours of work by family heads represented by the weighted simulation sample}} = \frac{33,434,000}{18,144,000} \cdot \frac{2153.1}{2194.9}$$

To procure the total production loss associated with a given program the average loss (from Table 14, column 8) was multiplied by the following ratio:

$$\mu = \alpha \cdot \frac{\text{Average annual earnings of male family heads, 14 through 64 years of age, who worked in 1966 and were not in the Armed Forces}^{2}}{\text{Average annual earnings of family heads represented by the weighted simulation sample}} = \frac{33,434,000}{18,144,000} \cdot \frac{7466}{7471}$$

To attempt to correct for the possibility that the income distribution associated with the weighted simulation sample does not adequately reflect reality, two pairs of income distributions were used. (See Table A-4.) The first pair excludes childless couples and is used in association with the Family Assistance-Food Stamp program, which also excludes such persons. The second pair includes childless couples and is used to adjust the simulation results for the President's Commission program. The first member of each pair is estimated from 1967 Current Population Survey data. The second member is calculated directly from the weighted simulation sample. The adjustment ratios are calculated by simply finding the income class that corresponds to the mean pre-program income of participating families and dividing the percentage of families that the CPS distribution indicates are in that class or below by the corresponding percentage from the sample distribution.

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[1] The hours per week component of this number is for 1967. The weeks per year component is for 1966. The following sources were used: Employment and Earnings, U.S. Department of Labor, Bureau of Labor Statistics, Vol. 14, No. 7, January 1968; and Special Labor Force Report No. 91, "Work Experience of the Population, 1966," U.S. Department of Labor, Bureau of Labor Statistics, 1968.

[2] The source for this number is an appendix volume to the SEO tape: "A Comparison of Selected Economic Characteristics from the 1966 and 1967 SEO's and Comparable CPS's," Table 3A.

Table A-4

CUMULATIVE PERCENTAGE DISTRIBUTION OF FAMILIES HEADED BY MALES WITH WIVES PRESENT, 14 THROUGH 61 YEARS OF AGE, WHO WORKED IN 1966 BY 1966 FAMILY INCOME

Income Class	Childless Couples Excluded		Childless Couples Included	
	CPS	Sample	CPS	Sample
	(1)	(2)	(3)	(4)
Less than $3000	4.4%	1.9%	5.5%	2.1%
$3000 - 3499	6.3	3.3	7.6	3.5
$3500 - 3999	8.4	4.7	9.9	5.1
$4000 - 4499	11.2	7.4	12.9	7.8
$4500 - 4999	14.1	10.5	15.9	10.7
$5000 - 5999	22.0	19.2	24.2	18.9
$6000 - 6999	32.3	28.5	34.5	29.1
$7000 - 7999	43.2	40.7	45.2	39.1
$8000 - 8999	53.1	52.7	55.0	50.4
$9000 - 9999	62.0	62.8	63.4	60.2
$10000 and over	100.0	100.0	100.0	100.0

Source:
Columns (1) and (3) were estimated from unpublished tabulations from the 1967 Current Population Survey.

For example, the mean pre-program income for participants in the Administration's FAP+FSP, when the lower bound procedure and the middle level substitution and income effect estimates are used, is $3941 (see Table 14A). The percentages from columns 1 and 2 of Table A-4 that correspond are 8.4 percent and 4.7 percent, respectively. The resulting adjustment ratio equals $\frac{8.4}{4.7}$.[1]

In Section VI we pointed out that because of possible underreporting of income in the CPS, the adjustment ratios discussed in the preceding paragraph may be too large. A comparison of family income distributions from the CPS and SEO (see Table A-5) is consistent with this possibility.[2]

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[1] A more elegant and precise approach would have been to construct ratios based on the noncumulative rather than the cumulative percentage of families in each income class, and to multiply each family's SEO weight by the ratio that corresponds to that family's income class. It was felt, however, that the more carefully detailed approach placed more confidence in the accuracy of the low end CPS distributions than was warranted. One problem, for example, is that there simply are not many families headed by married males with work experience who are at the low end of the income distribution to begin with and a survey that is based on a small sub-set of this population may not be entirely reliable. (Also see "A Comparison of Selected Economic Characteristics," pp. 18-23.)

[2] While Columns (2) and (4) in Table A-4 are based on the sample used in this study, Table A-5, column (2) is based on all families that were interviewed during the survey of Economic Opportunity.

Table A-5

CUMULATIVE PERCENTAGE DISTRIBUTION OF ALL U.S. FAMILIES
BY 1966 FAMILY INCOME

	CPS	SEO
	(1)	(2)
Less than $3000	14.3%	13.1%
$3000-3499	17.8	16.8
$3500-3999	21.1	20.0
$4000-4999	28.2	27.1
$5000-5999	36.6	35.9
$6000-6999	45.9	44.4
$7000-7999	55.2	53.4
$8000-8999	63.4	62.0
$9000-9999	70.4	69.2
$10,000 and over	100.0	100.0

Source:
"A Comparison of Selected Economic Characteristics," Table 15.

Appendix B

REGRESSIONS FOR DEMOGRAPHIC GROUPS

DEMOGRAPHIC GROUP DESCRIPTIONS

1 Entire sample of male family heads less than 62 years old (includes those who did not work at their usual job the week before the survey)

2 Entire sample of male family heads less than 62 years old (excludes those who did not work at their usual job the week before the survey)[1]

3 Negroes

4 Age: less than 25

5 Age: more than 55

6 Age: 25 to 55

7 SEO sub-sample based on CPS sample frame

8 SEO sub-sample based on nonwhite supplement

9 Towns (outside SMSAs)

10 Rural areas (outside SMSAs)

11 Suburbs (of SMSAs)

12 Central cities (of SMSAs)

13 Negroes in the suburbs of SMSAs

14 Whites in poor areas of central cities of SMSAs with more than 250,000 inhabitants

15 Negroes in poor areas of central cities of SMSAs with more than 250,000 inhabitants

16 Whites in non-poor areas of central cities of SMSAs with more than 250,000 inhabitants

17 Negroes in non-poor areas of central cities of SMSAs with more than 250,000 inhabitants.

18 Southern Census Region

19 Whites in poor rural southern counties

20 Negroes in poor rural southern counties

21 Suburbs of SMSAs with more than 750,000 inhabitants

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[1] Demographic groups 2-39 exclude those who did not work at their usual job the week before the survey.

22 Central cities of SMSAs with more than 750,000 inhabitants

23 Poor areas of central cities of SMSAs with more than 750,000 inhabitants

24 SMSAs with more than 750,000 inhabitants

25 New York City Consolidated Metropolitan Statistical Area

26 Persons of low socio-economic status

27 Persons of low socio-economic status in poor areas of central cities of SMSAs with more than 250,000 inhabitants

28 Private sector wage and salary earners

29 Heads of interview units with only two persons over 18 years

30 Heads of interview units with husband and wife only

31 Heads of interview units with husband, wife, and others

32 Heads of interview units where only the husband had earned income

33 Heads of interview units eligible to participate in negative income tax recommended by the President's Commission on Income Maintenance Programs (lower bound procedure)

34 Heads of interview units with at least one child under 18 years

35 Heads of interview units eligible to participate in the Nixon Administration's Family Assistance Plan (lower bound procedure)

36 Interview unit excluded if the value for any variable was imputed by the Census Bureau

37 Interview unit excluded if head was institutionalized or in Armed Forces in 1966

38 Interview unit excluded if head was institutionalized or in Armed Forces in 1966 or was too ill or disabled to work during part of 1966

39 Entire sample of unattached men, less than 62 years old (excludes those who did not work at their usual job the week previous to the survey)

Table B-1

MEANS OF THE VARIABLES USED IN THE MODEL

(Definitions of the variable symbols used in the column headings of this table are found in Table A-2)

Demographic Group	L_n	W_n	E_s	E_o	Y_f^a	Y_f^f	DY_f^f	ID_f	TF_f	LY_f or ID_f^f	BY_f	DY_f^o	M_f	A_h	D_h	R_h	G_h	# Observations
1	2157.019	2.905	1121.222	291.338	679.660	380.320	-41.130	45.144	82.611	126.088	29.178	-39.731	7250.503	38.536	2.340	0.321	10.535	7093
2	2174.319	2.970	1128.049	301.013	717.732	398.475	-41.456	49.334	79.948	136.833	28.319	-39.411	7744.481	39.346	2.335	0.312	10.560	6044
3	2062.381	2.350	1214.810	326.819	322.017	185.061	-42.674	8.324	61.136	28.212	5.954	-43.168	3068.740	40.062	2.851		8.932	1797
4	2111.740	2.511	1203.370	49.649	177.371	117.758	-43.007	20.761	43.297	52.191	5.296	-38.343	1632.805	22.392	1.159	0.275	11.554	498
5	2134.661	2.791	1013.245	594.459	1194.138	730.945	-22.163	102.465	150.386	258.095	35.529	-21.638	12710.022	57.711	1.229	0.325	8.819	650
6	2185.949	3.040	1135.630	287.623	709.446	382.889	-43.860	45.187	74.325	129.343	29.703	-41.879	7706.902	38.632	2.602	0.314	10.690	4896
7	2210.488	3.222	1100.180	295.885	853.970	474.339	-41.697	66.388	85.919	180.213	32.227	-38.640	9338.842	39.005	2.187	0.101	11.245	3953
8	2105.941	2.493	1180.735	310.708	460.174	255.056	-41.002	17.093	68.660	54.823	20.929	-40.868	4730.369	39.990	2.616	0.711	9.266	2091
9	2267.779	2.838	1298.985	252.143	769.676	431.168	-43.588	77.009	76.490	170.181	40.245	-39.888	8317.440	38.939	2.024	0.097	11.117	539
10	2205.898	2.356	855.775	264.883	629.644	373.563	-35.199	24.870	77.289	78.429	58.705	-29.462	6789.126	38.866	2.662	0.252	9.550	1101
11	2197.518	3.413	1078.582	300.513	935.916	512.118	-42.797	67.977	85.365	189.619	24.789	-42.183	10450.840	39.107	2.297	0.155	11.306	1944
12	2121.374	2.922	1251.547	328.287	573.356	312.656	-42.731	39.487	77.615	113.950	14.895	-41.568	5907.839	39.838	2.287	0.511	10.301	2460
13	2109.186	2.499	1207.600	347.400	469.566	271.294	-54.786	17.749	62.255	49.926	20.509	-51.175	5069.422	39.778	3.193		8.927	275
14	2108.964	2.796	1036.478	300.545	458.802	259.180	-40.029	30.375	73.036	102.619	15.634	-35.254	4614.143	38.255	2.0402		9.263	224
15	2047.812	2.453	1213.720	297.871	234.168	139.411	-40.227	6.045	60.063	18.843	0.721	-45.306	1987.783	40.384	2.545		9.112	688
16	2174.059	3.582	1141.137	414.373	942.834	498.707	-41.8081	83.440	93.411	233.696	19.809	-38.456	10239.184	40.043	2.064		11.758	718
17	2067.829	2.909	1805.590	290.919	462.843	239.105	-50.538	12.789	65.773	52.399	5.094	-50.148	4439.559	39.126	2.301		10.570	356
18	2159.524	2.511	1075.720	289.682	525.648	308.785	-40.738	26.884	69.801	79.667	32.428	-37.576	5621.192	39.385	2.486	0.436	9.599	2368
19	2257.133	2.516	1093.232	176.936	674.587	392.320	-41.115	26.040	79.138	80.327	86.488	-34.507	7293.750	37.910	2.042		10.160	500
20	1985.587	1.423	553.642	381.330	203.130	146.336	-23.425	1.479	50.986	7.306	3.209	-23.573	1866.213	40.575	3.883		6.660	282
21	2184.875	3.636	1091.835	291.367	1011.426	560.087	-40.044	80.371	94.651	199.059	27.341	-40.268	11240.663	39.121	2.328	0.136	11.651	1200
22	2084.357	2.983	1327.275	331.615	551.280	296.054	-39.175	37.816	71.000	114.302	8.559	-38.545	5653.709	39.838	2.208	0.584	10.279	1606

Table B-1 (continued)

Demographic Group	L_n	W_n	E_s	E_o	Y_f^a	Y_f^f	DY_f^f	ID_f	TR_f	LY_f or ID_f	BY_f	DY_f^o	M_f	A_h	D_h	R_h	G_h	# Observations
23	2051.995	2.573	1194.713	279.225	298.043	172.244	-36.668	12.567	54.571	41.810	9.392	-41.056	2806.044	40.024	2.362	0.779	9.163	757
24	2127.344	3.262	1226.588	314.403	748.064	408.969	-39.546	56.015	81.108	105.549	16.592	-39.282	8042.998	39.531	2.259	0.392	10.866	2806
25	2102.282.	3.234	1188.153	414.481	696.004	352.663	-31.537	62.306	54.886	151.295	19.587	-24.374	7557.134	39.802	2.019	0.298	10.727	484
26	2098.257	2.280	973.313	364.020	438.840	272.607	-35.490	19.510	72.614	52.367	12.047	-35.362	4400.484	40.679	2.661	0.536	8.479	1845
27	2042.637	2.304	1085.862	328.737	208.183	140.862	-32.645	6.317	56.282	19.811	0.639	-43.906	1739.465	41.855	2.444	0.831	8.275	426
28	2181.676	2.912	1072.403	304.415	678.553	383.616	-39.945	49.136	73.195	138.263	21.382	-36.445	7340.119	39.063	2.337	0.302	10.257	4912
29	2186.983	3.015	1122.811	30.067	658.386	352.562	-42.645	48.642	58.734	138.537	27.965	-39.865	7292.391	37.241	2.046	0.295	10.925	4658
30	2108.801	2.786	1757.731		869.370	506.177	-30.443	79.630	72.827	207.451	35.258	-27.258	9658.437	43.423		0.326	10.241	1086
31	2188.670	3.010	990.124	366.947	684.517	374.884	-43.869	42.698	81.508	121.364	26.799	-41.983	7325.248	38.453	2.847	0.309	10.630	4950
32	2203.714	3.273			762.139	430.016	-34.685	60.262	83.709	163.030	26.516	-34.822	8221.267	38.270	2.324	0.221	11.002	2129
33	2077.228	1.901	350.888	209.479	136.792	95.446	-34.038	2.758	29.768	10.010	4.652	-38.388	1370.762	37.473	4.158	0.613	8.256	1174
34	2196.920	3.009	947.557	294.119	640.032	342.331	-45.224	39.531	72.050	112.746	27.456	-43.446	6888.529	37.597	3.047	0.318	10.670	4409
35	2093.346	1.899	342.079	311.447	157.137	120.339	-35.072	1.867	48.251	6.579	1.045	-35.671	1425.543	37.534	4.512	0.628	8.189	998
36	2173.900	2.959	1116.305	296.606	703.212	387.298	-41.564	46.710	75.941	134.684	28.966	-40.293	7625.503	39.277	2.342	0.310	10.537	5598
37	2179.566	2.971	1128.169	302.615	718.167	397.335	-41.481	49.548	77.456	137.263	28.469	-39.415	7779.734	39.414	2.341	0.312	10.551	6012
38	2200.425	2.980	1126.682	294.417	719.081	393.677	-41.439	50.116	70.215	139.201	29.506	-39.564	7885.596	39.278	2.341	0.310	10.612	5751
39	2052.204	2.6302			326.034	154.811	-16.516	49.809	33.008	131.078	17.774	-17.122	3331.692	40.532		0.458	10.342	611

Table B-2

ESTIMATED COEFFICIENTS OF REGRESSION EQUATIONS TO PREDICT THE VALUE OF ASSET HOLDINGS ACCUMULATED BY HOUSEHOLDS

Demographic Group	Age Coefficient (A_h)	Wage Rate Coefficient (W_h)	Wage Rate Squared (W_h^2)	Constant	R^2	Standard Error	F
1	325.270 (24.319)	3048.214 (22.614)	-72.608 (-12.175)	-13334.982	0.142	12303.078	391.211
2	322.408 (21.768)	3186.638 (21.615)	-74.828 (-12.128)	-13558.218	0.138	12454.086	323.407
3	153.582 (10.192)	1950.758 (8.894)	-83.100 (-5.103)	-7089.004	0.095	6876.384	62.678
4	324.620 (3.082)	621.189 (1.077)	6.833 (0.077)	-7244.986	0.053	3654.768	9.257
5	587.316 (2.110)	6295.471 (7.164)	-210.249 (-2.514)	-36657.528	0.179	14102.641	47.037
6	350.672 (16.021)	2996.828 (18.211)	-71.043 (-10.970)	-14105.655	0.107	12737.171	196.238
7	399.806 (20.149)	2886.425 (14.927)	-65.364 (-9.163)	-14696.191	0.142	13429.329	216.982
8	199.001 (10.020)	3272.287 (11.473)	-137.627 (-6.070)	-10306.746	0.110	9874.299	86.147
9	316.012 (7.748)	3693.819 (5.776)	-133.455 (-2.827)	-13151.120	0.174	10863.913	37.540
10	259.934 (8.423)	5990.076 (8.522)	-476.027 (-4.758)	-14080.686	0.147	11194.789	62.872
11	435.545 (13.241)	2364.605 (7.986)	-52.909 (-5.900)	-13853.181	0.111	14991.947	80.758
12	288.641 (14.821)	4457.996 (15.484)	-176.717 (-8.418)	-16762.704	0.183	10568.266	182.811
13	233.024 (4.027)	5724.841 (4.241)	-539.875 (-3.089)	-14462.632	0.116	9786.618	11.867
14	312.542 (6.354)	2794.715 (3.140)	-107.374 (-1.683)	-14126.371	0.209	7965.289	19.432
15	134.022 (7.539)	1718.106 (3.335)	-133.311 (-2.209)	-6700.551	0.094	5221.558	23.655

Table B-2 (continued)

Demographic Group	Age Coefficient (A_h)	Wage Rate Coefficient (W_h)	Wage Rate Squared (W_h^2)	Constant	R^2	Standard Error	F
16	456.533 (9.059)	5595.543 (6.775)	-235.371 (-4.052)	-24519.832	0.179	14898.420	51.846
17	225.493 (6.066)	3276.340 (3.577)	-253.627 (-2.492)	-11455.578	0.146	6870.702	20.097
18	223.484 (11.626)	3502.536 (15.123)	-142.672 (-9.663)	-10765.267	0.136	10214.388	123.595
19	254.270 (5.872)	2899.485 (4.450)	-100.379 (-2.159)	-8814.401	0.111	10786.510	20.612
20	100.675 (5.158)	2860.953 (2.695)	-197.969 (-0.716)	-5799.102	0.202	3479.642	23.386
21	453.279 (10.765)	2117.722 (5.550)	-46.872 (-4.581)	-13369.594	0.109	15103.843	48.574
22	287.138 (11.228)	4922.876 (11.131)	-216.675 (-5.885)	-18152.982	0.170	11182.107	109.062
23	189.472 (8.605)	2199.457 (3.286)	-78.493 (-0.980)	-9835.160	0.134	6775.752	38.932
24	347.899 (14.869)	3311.587 (14.560)	-72.502 (-9.645)	-15525.351	0.136	13243.569	146.900
25	273.472 (6.597)	5379.323 (8.715)	-246.735 (-6.089)	-17510.152	0.223	9698.031	45.961
26	187.105 (11.526)	3182.034 (12.953)	-137.020 (-7.397)	-9552.480	0.146	7913.381	104.916
27	135.266 (5.822)	644.681 (0.955)	-41.493 (-0.522)	-5146.977	0.078	5428.540	11.827
28	306.978 (19.430)	3394.985 (20.943)	-76.121 (-12.278)	-13711.394	0.145	12156.853	276.804
29	340.171 (29.504)	2730.036 (16.321)	-64.684 (-9.991)	-12845.674	0.124	12606.378	218.584
30	350.401 (9.488)	5361.644 (8.888)	-216.341 (-5.242)	-18393.142	0.144	16302.780	60.690
31	300.098 (18.432)	3000.372 (20.523)	-67.997 (-11.693)	-12452.640	0.138	11396.943	264.387

Table B-2 (continued)

Demographic Group	Age Coefficient (A_h)	Wage Rate Coefficient (W_h)	Wage Rate Squared (W_h^2)	Constant	R^2	Standard Error	F
32	344.219 (13.666)	3026.115 (13.689)	-65.601 (-9.193)	-13910.609	0.155	12404.906	129.598
33	81.485 (6.782)	1170.661 (3.297)	-96.843 (-1.617)	-3485.263	0.051	4057.871	21.074
34	273.186 (15.463)	2783.252 (18.884)	-63.284 (-11.228)	-11018.389	0.123	10883.839	205.176
35	98.911 (7.740)	1440.567 (3.945)	-106.232 (-1.772)	-4562.980	0.087	3846.603	31.749
36	317.342 (20.972)	3096.115 (20.565)	-72.979 (-11.910)	-13176.753	0.137	12230.841	295.515
37	321.695 (21.563)	3190.632 (21.558)	-74.940 (-12.111)	-13530.676	0.137	12484.556	319.158
38	329.264 (21.276)	3188.672 (20.839)	-74.612 (-11.840)	-13700.045	0.137	12646.732	304.245
39	135.265 (5.293)	3020.446 (6.512)	-97.572 (-2.113)	-9199.298	0.173	7790.609	42.386

Table B-3A

ESTIMATED WAGE RATE COEFFICIENTS FOR A LINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE, INCOME COEFFICIENTS FOR ACCRUED NONEMPLOYMENT INCOME AND COEFFICIENTS FOR RELATIVE PREFERENCES AND FOR OTHER ECONOMIC AND DEMOGRAPHIC CONTROL VARIABLES

(Definitions of the variable symbols used in the column headings of this table are found in Table A-2)

Demographic Group	Y_f^a	W_h	P_h	E_s	E_o	D_h	R_h	S_h	K_h	A_h	A_h^2	Constant	#Observations	R^2	Std. Error	F
1	-.072	-100.758	552.903	-.019	-.025	10.625	-204.321	27.511	-167.694	38.995	-.412	1450.028	7093	.121	546.566	88.460
	(-6.989)	(-21.027)	(9.863)	(-4.673)	(-3.354)	(2.921)	(-13.491)	(12.566)	(-6.713)	(8.099)	(-6.877)					
2	-.069	-103.202	555.403	-.017	-.026	12.383	-188.177	27.270	-131.387	30.103	-.308	1637.801	6044	.134	509.190	84.558
	(-6.771)	(21.624)	(9.787)	(-4.226)	(-3.447)	(3.328)	(-12.233)	(12.305)	(-5.149)	(6.059)	(-5.022)					
3	-.013	-110.929	215.090	.006	-.014	1.863		22.659	-90.277	16.625	-.184	1774.422	1797	.084	467.722	16.485
	(-.486)	(-11.104)	(10.687)	(.903)	(-1.219)	(.391)		(6.166)	(-2.055)	(2.002)	(-1.809)					
4	-.322	-154.946	1326.507	-.017	.006	12.174	-285.952	-11.062	92.296	631.686	-13.799	-4428.431	498	.119	607.283	5.979
	(-3.188)	(-4.947)	(2.890)	(-.889)	(.084)	(.415)	(-4.284)	(-.785)	(.607)	(1.423)	(-1.349)					
5	.011	-113.143	48.395	-.014	-.005	6.624	-103.944	33.755	-227.319	421.648	-3.594	-10132.001	650	131	492.651	8.733
	.624	(-7.422)	(.981)	(-1.166)	(-.335)	(.538)	(-2.187)	(5.605)	(-4.081)	(.646)	(-.637)					
6	-.085	-103.082	665.608	-.016	-.028	11.117	-189.554	27.877	-113.983	37.107	-.415	154.486	4896	.147	498.079	76.289
	(-7.161)	(-20.771)	(9.776)	(-3.516)	(-3.307)	(2.853)	(-11.367)	(11.685)	(-3.979)	(4.055)	(-3.566)					
7	-.096	-105.527	754.834	-.026	-.026	19.000	-168.267	27.902	-134.930	32.836	-.323	1589.772	3953	.144	511.308	60.177
	(-7.556)	(-19.196)	(9.522)	(-5.167)	(-2.787)	(3.583)	(-5.998)	(9.782)	(-4.204)	(5.220)	(-4.152)					
8	-.028	-105.457	344.837	.002	-.025	6.149	-171.608	24.079	-119.872	19.434	-.199	1842.273	2091	.104	502.912	21.910
	(-1.311)	(-10.763)	(3.601)	(.349)	(-2.063)	(1.179)	(-6.775)	(6.724)	(-2.860)	(2.362)	(-1.972)					
9	-.059	-110.424	772.292	-.032	-.056	36.558	-231.123	21.438	-191.688	3.199	.037	2221.667	539	.156	522.498	8.867
	(-1.527)	(-5.650)	(4.329)	(-2.216)	(-1.790)	(2.423)	(-2.756)	(2.696)	(-2.384)	(.192)	(-.182)					
10	.024	-174.871	15.686	-.004	-.013	8.210	-409.987	25.490	-144.331	31.239	-.405	1907.719	1101	.139	560.769	15.998
	(1.060)	(-9.687)	(.202)	(-.339)	(-.568)	(.897)	(-8.682)	(4.360)	(-2.636)	(2.440)	(-2.536)					
11	-.130	-94.166	933.286	-.026	-.026	11.835	-126.565	24.956	-166.005	48.777	-.513	1332.826	1944	.154	496.998	31.850
	(-6.760)	(-14.371)	(7.548)	(-3.767)	(-2.008)	(1.683)	(-3.770)	(6.272)	(-3.401)	(5.357)	(-4.590)					
12	-.078	105.049	710.517	-.013	-.026	14.003	-147.360	28.807	-76.400	24.952	-.222	1630.223	2460	.135	482.531	34.876
	(-4.710)	(-12.640)	(6.864)	(-2.249)	(-2.558)	(2.648)	(-7.047)	(8.836)	(-1.892)	(3.468)	(-2.505)					
13	.073	-171.085	49.876	-.020	.004	-8.943		28.337	-361.717	39.965	-.527	1618.778	275	.210	432.784	7.009
	(1.414)	(-6.328)	(.251)	(-1.210)	(.141)	(-.864)		(3.418)	(-2.977)	(1.871)	(-2.012)					
14	-.003	-75.346	576.495	.012	-.045	30.165		39.946	-13.284	12.892	-.100	1554.772	224	.103	505.902	2.433
	(-.032)	(-2.543)	(1.129)	(.523)	(-1.132)	(1.403)		(3.631)	(-.100)	(.474)	(-2.98)					
15	-.062	-136.680	124.153	.002	-.038	18.069		26.042	2.410	5.298	-.007	1921.607	688	.124	422.166	9.609
	(-1.277)	(-8.291)	(.549)	(.145)	(-2.271)	(2.432)		(4.570)	(.032)	(.447)	(-.045)					
16	-.096	-133.411	851.451	-.034	-.034	4.714		26.888	-137.158	41.126	-3364	1456.151	718	.179	521.551	15.369
	(-3.483)	(-8.722)	(3.900)	(-2.995)	(-1.858)	(.374)		(3.846)	(-1.715)	(2.720)	(-1.970)					

Table B-3A (continued)

Demographic Group	Y_f^a	W_h	P_h	E_s	E_o	D_h	R_h	S_h	K_h	A_h	A_h^2	Constant	#Observa-	R^2	Std. Error	F
17	-.082 (-1.719)	-93.312 (-4.377)	698.220 (3.153)	.006 (.536)	-.015 (-.636)	25.390 (2.127)		9.522 (1.155)	-254.357 (-2.100)	4.998 (.282)	-.045 (-.202)	2096.226	356	.118	411.702	4.622
18	-.093 (-4.704)	-111.793 (-13.119)	693.362 (7.416)	-.004 (-.499)	-.014 (-1.104)	8.796 (1.603)	219.035 (-8.971)	27.188 (7.838)	-177.041 (-4.459)	17.694 (2.183)	-.171 (-1.704)	1912.051	2368	.144	523.480	35.930
19	-.079 (-1.477)	-85.276 (-4.134)	909.837 (3.707)	.000 (.032)	.033 (-.849)	22.523 (1.307)		12.198 (1.467)	208.665 (-2.694)	14.696 (.795)	-.154 (-.657)	1691.969	500	.114	557.148	6.137
20	.048 (.445)	-174.219 (-2.820)	-182.762 (-.527)	.044 (1.044)	-.032 (-.680)	-5.191 (-.378)		17.189 (1.305)	8.153 (.077)	26.348 (.857)	-.366 (-.981)	1691.969	282	.051	607.432	1.466
21	-.148 (-6.197)	-82.829 (-11.184)	1057.333 (6.266)	.035 (4.033)	.034 (2.036)	8.564 (.953)	-132.256 (-2.981)	19.463 (3.696)	-179.624 (-2.807)	55.288 (4.663)	-.568 (3.914)	1234.574	1200	.157	502.888	20.133
22	-.072 (-3.720)	-111.769 (-10.453)	651.480 (5.429)	-.008 (-1.195)	-.031 (-2.610)	15.977 (2.441)	-153.069 (-5.940)	27.494 (6.880)	-119.101 (-2.355)	19.485 (2.209)	-.151 (-1.397)	1735.437	1606	.133	471.096	22.298
23	.024 (.503)	-120.183 (-6.523)	59.151 (.247)	.001 (.118)	-.047 (-2.585)	21.393 (2.526)	-108.020 (-2.577)	29.887 (5.293)	-38.090 (-.536)	5.873 (.470)	-.019 (-1126)	1925.258	757	.096	459.641	7,186
24	-.113 (-7.722)	-86.941 (-14.478)	852.481 (8.838)	-.020 (-3.766)	-.032 (-3.347)	14.540 (2.743)	-163.020 (-7.954)	24.265 (7.667)	-138.115 (-3.464)	34.214 (4.808)	-.323 (-3.705)	1495.839	2806	.142	486.696	42.124
25	-.072 (-1.753)	-123.635 (-7.857)	785.826 (3.153)	-.020 (-1.635)	-.026 (-1.404)	15.938 (1.208)	-125.017 (-2.590)	26.315 (3.416)	-145.409 (-1.607)	12.949 (.813)	-.081 (-.412)	1939.079	484	.191	445.915	10.110
26	.023 (1.047)	-141.018 (-12.644)	-6.605 (-.077)	.004 (.482)	.015 (-1.184)	6.799 (1.210)	-154.622 (-5.992)	26.493 (6.174)	-167.601 (-3.999)	15.907 (1.835)	-.202 (-1.902)	1980.224	1845	.113	518.881	21.231
27	.013 (.207)	-165.970 (-7.905)	-167.324 (-.627)	.002 (.105)	.017 (.760)	9.848 (1.030)	-7.476 (.138)	30.627 (4.440)	.051	24.196 (1.617)	-.261 (-1.443)	1622.778	426	.175	415.512	7.981
28	-.056 (-4.913)	-103.653 (-19.094)	471.666 (7.413)	-.018 (-3.771)	-.025 (-3.072)	10.663 (2.622)	-203.637 (-11.727)	29.674 (11.668)	-124.085 (-4.429)	30.927 (5.729)	-.332 (-4.982)	1628.421	4912	.133	506.684	68.188
29	-.112 (-8.325)	-102.088 (-19.637)	843.940 (10.943)	-.018 (-3.773)	.022 (.532)	17.696 (3.608)	-186.681 (-10.393)	27.785 (10.744)	-96.160 (-3.041)	34.215 (5.817)	-.337 (4.567)	1541.861	4658	.146	518.516	72.288
30	-.035 (-2.489)	-89.934 (-7.524)	291.030 (5.645)	-.010 (-1.210)			-135.146 (-3.745)	208.888 (4.045)	-34.454 (-.672)	21.959 (2.231)	-.198 (-1.663)	1690.623	1086.	.108	501.611	14.490
31	-.059 (-4.937)	-108.730 (-20.910)	501.449 (7.467)	-.014 (-2.902)	-.025 (-3.192)	7.378 (1.709)	-197.728 (-11.494)	28.564 (11.580)	-162.960 (-5.550)	29.652 (5.023)	-.315 (-4.268)	1683.772	4958	.139	510.428	72.317
32	-.099 (-5.931)	-87.179 (-13.436)	794.647 (7.363)			11.336 (1.600)	-177.800 (-6.089)	28.472 (7.649)	-80.107 (-1.693)	29.895 (3.378)	-.301 (-2.773)	1601.049	2129	.144	518.379	39.680

Table B-3A (continued)

Demographic Group	Y_f^a	W_h	P_h	E_s	E_o	D_h	ER_h	S_h	K_h	A_h	A_h^2	Constant	# Observations	R^2	Std. Error	F
33	-.089 (-1.196)	-249.531 (-11.718)	311.311 (1.408)	-.057 (-2.259)	-.061 (-2.057)	34.264 (4.491)	-210.394 (-5.834)	28.575 (5.176)	-239.169 (-4.236)	51.199 (3.943)	-.646 (3.937)	1424.685	1174	.156	570.351	19.597
34	-.091 (-6.393)	-110.074 (-20.375)	744.384 (9.137)	-.014 (-2.716)	-.012 (-1.346)	5.660 (1.233)	-202.651 (-11.170)	30.096 (11.593)	-139.955 (-4.342)	31.261 (4.715)	-.325 (-3.869)	1652.870	4409	.153	508.857	72.166
35	-.025 (-.405)	-241.188 (-10.625)	326.514 (1.630)	-.055 (-1.968)	-.037 (-1.801)	20.059 (2.414)	-198.466 (-5.124)	258.466 (4.382)	25.845 (-4.066)	-246.662 (2.689)	38.465 (-2.539)	-.458	998	.142	557.915	14.870
36	-.068 (-6.200)	-103.058 (-21.108)	537.991 (8.795)	-.019 (-4.494)	-.022 (-2.760)	11.362 (2.933)	-184.416 (-11.551)	26.937 (11.679)	-128.154 (-4.865)	30.456 (5.884)	-.314 (-4.908)	1635.963	5598	.131	508.826	76.483
37	-.062 (-6.097)	-104.360 (-22.068)	515.449 (9.142)	-.018 (-4.483)	-.026 (-3.497)	11.806 (3.207)	-187.444 (-12.295)	27.552 (12.565)	-130.243 (-5.159)	26.998 (5.462)	-.279 (-4.574)	1713.863	6012	.136	503.195	85.690
38	-.054 (-5.324)	-104.609 (-22.153)	467.988 (8.281)	-.018 (-4.309)	-.017 (-2.267)	11.146 (2.999)	-183.033 (-11.940)	26.424 (12.015	-66.771 (-2.470)	26.694 (5.370)	-.277 (-4.518)	1742.072	5751	.132	494.015	79.493
39	-.050 (-1.483)	-90.864 (-4.840)	615.781 (6.927)				-112.463 (-2.266	30.211 (4.878)	-241.877 (-2.730)	62.127 (4.335)	-.653 (-3.743)	694.286	611	.213	563.844	20.377

Table B-3B

ESTIMATED WAGE RATE COEFFICIENTS FOR A LINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE, INCOME COEFFICIENTS FOR NONEMPLOYMENT INCOME FLOWS AND COEFFICIENTS FOR RELATIVE PREFERENCES AND FOR OTHER ECONOMIC AND DEMOGRAPHIC CONTROL VARIABLES

(Definitions of the variable symbols used in the column headings of this table are found in Table A-2)

Demographic Group	Y_f^f	W_h	P_h	E_s	E_o	D_h	R_h	S_h	K_h	A_h	A_h^2	Constant	# Observations	R^2	Std. Error	F
1	-.065	-106.389	355.390	-.019	-.024	10.044	-205.114	26.731	-167.062	36.375	-.397	1527.767	7093	.119	54.701	81.266
	(-6.101)	(-22.864)	(9.213)	(-4.653)	(-3.221)	(2.761)	(-13.519)	(12.245)	(-6.681)	(7.580)	(-6.612)					
2	-.067	-108.354	374.387	-.017	-.024	11.834	-189.229	26.515	-130.209	27.537	-.291	1712.247	6044	.133	509.480	83.836
	(-6.238)	(-23.382)	(9.428)	(-4.21)	(-3.278)	(3.180)	(-12.283)	(12.003)	(-5.099)	(5.563)	(-4.745)					
3	-.081	-109.859	289.298	.006	.-015	2.315		23.461	-86.759	17.209	-.182	1746.476	1797	.088	466.907	17.166
	(-2.545)	(-11.259)	(3.374)	(.868)	(-1.268)	(.486)		(6.405)	(-1.977)	(2.083)	(-1.792)					
4	-.428	-155.633	1105.109	-.023	.005	10.771	-291.516	-8.395	95.684	664.899	-14.639	-4773.466	498	.135	601.966	6.869
	(-4.355)	(-5.056)	(2.923)	(-1.212)	(.063)	(.371)	(-4.419)	(-.600)	(.609)	(1.511)	(-1.444)					
5	-.010	-109.658	65.639	-.015	-.006	6.507	-113.500	34.438	-228.061	401.581	-3.412	-9272.338	650	.131	492.716	8.715
	(-.468)	(-7.438)	(1.399)	(-1.201)	(-.407)	(.527)	(-2.387)	(5.725)	(-4.095)	(.616)	(.606)					
6	-.067	-108.773	392.297	-.015	-.027	10.452	-190.131	26.749	-113.596	33.249	-.392	1649.336	4896	.143	499.099	74.163
	(-5.578)	(-22.421)	(8.758)	(-3.400)	(-3.126)	(2.677)	(-11.370)	(11.237)	(-3.957)	(3.633)	(-3.354)					
7	-.071	-112.454	417.081	-.026	-.023	17.822	-171.957	26.816	-135.691	28.974	-.306	1699.870	3953	.139	512.847	57.670
	(-5.757)	(-20.906)	(7.995)	(-5.015)	(-2.502)	(3.352)	(-6.109)	(9.397)	(-4.214)	(4.612)	(-3.922)					
8	-.064	-105.712	382.216	.002	-.026	6.235	-174.377	24.181	-116.700	18.999	-.191	1850.400	2091	.106	502.335	22.395
	(-2.551)	(-11.273)	(4.917)	(.321)	(-2.103)	(1.198)	(-6.889)	(6.797)	(-2.785)	(2.323)	(-1.893)					
9	-.046	-117.903	620.768	-.032	-.055	35.901	-236.181	21.203	-196.225	1.660	.046	2267.106	539	.154	523.116	8.733
	(-1.040)	(-6.343)	(4.954)	(-2.170)	(-1.760)	(2.376)	(-2.803)	(2.659)	(-2.440)	(.100)	(.221)					
10	.008	-169.609	57.836	-.005	-.013	8.016	-412.345	26.171	-143.325	32.295	-.409	1871.004	1101	.138	561.034	15.889
	(.307)	(-9.641)	(.849)	(-.375)	(-.567)	(.875)	(-8.736)	(4.503)	(-2.612)	(2.530)	(-2.565)					
11	-.066	-98.795	347.445	-.025	-.025	10.134	-131.362	22.996	-170.536	42.971	-.495	1480.931	1944	.142	500.430	29.014
	(-4.320)	(-15.092)	(5.102)	(-3.654)	(-1.923)	(1.432)	(-3.884)	(5.760)	(-3.471)	(4.719)	(-4.395)					
12	-.104	-112.630	517.303	-.013	-.024	13.862	-149.012	28.968	-70.637	21.621	-.189	1716.534	2460	.137	481.995	35.449
	(-5.262)	(-14.497)	(6.992)	(-2.331)	(-2.363)	(2.625)	(-7.130)	(8.894)	(-1.752)	(3.020)	(-2.130)					
13	-.009	-162.155	278.338	-.017	.005	-8.504		30.567	-362.296	44.183	-.556	1488.062	275	.204	434.403	6.761
	(-.148)	(-6.137)	(1.998)	(-1.022)	(.179)	(-.265)		(3.710)	(-2.971)	(2.065)	(-2.115)					
14	-.069	-72.331	790.588	.012	-.046	32.303		40.995	-14.490	14.655	-.103	1485.337	224	.106	504.942	2.523
	(-.901)	(-2.604)	(2.139)	(.525)	(-1.163)	(1.500)		(3.741)	(-.114)	(.555)	(.310)					
15	-.145	-136.879	199.419	.001	-.040	19.049		26.658	13.605	4.591	.009	1920.665	688			
	(-2.738)	(-8.493)	(1.124)	(.141)	(-2.419)	(2.572)		(4.701)	(.202)	(.389)	(.063)					
16	-.083	-148.412	331.448	-.034	-.031	3.526		27.539	-129.478	33.699	-.305	1651.539	718	.173	523.329	14.785
	(-2.693)	(-10.427)	(2.600)	(-2.962)	(-1.729)	(.279)		(3.923)	(-1.614)	(2.220)	(-1.630)					

Table B-3B (continued)

Demographic Group	Y_f^f	W_h	T_h	E_s	E_o	D_h	R_h	S_h	K_h	A_h	A_h^2	Constant	# Observations	R^2	Std. Error	F
17	-.117 (-1.752)	-97.838 (-4.568)	604.352 (13.608)	.004 (.110)	-.012 (-.152)	24.515 (3.455)		9.215 (2.867)	-241.223 (-10.973)	3.454 4.188	-.031 .469	2145.317	356	.118	411.633	4.635
18	-.086 (-4.019)	-117.422 (-14.070)	499.865 (7.211)	-.004 (-6608)	-.013 (-1.039)	8.394 (1.528)	-217.274 (-8.888)	25.851 (7.506)	-177.722 (-4.470)	15.235 (1.886)	-.157 (-1.567)	1991.704	2368	.142	524.140	35.301
19	-.022 (-.418)	-92.711 (-4.633)	629.750 (4.295)	.002 (.138)	-.031 (-.801)	21.968 (1.272)		11.013 (1.327)	-213.097 (2.747)	12.517 (.678)	-.152 (-.650)	2135.783	500	.111	558.289	6.092
20	-.015 (-.126)	-166.331 (-2.788)	-114.335 (-.352)	-.043 (-1.016)	-.032 (-.683)	-5.348 (-.390)		18.078 (1.378)	6.586 (.063)	27.405 (.893)	-.370 (-.993)	1648.650	282	.051	607.636	1.447
21	-.084 (-4.256)	-86.430 (-11.633)	431.600 (4.058)	-.035 (-3.972)	-.033 (-1.992)	7.569 (.835)	-133.843 (-2.992)	16.646 (3.145)	-170.432 (-2.639)	46.925 (3.958)	-.524 (-3.581)	1433.167	1200	.143	507.100	18.013
22	-.101 (-4.195)	-119.878 (-12.025)	469.887 (5.521)	-.008 (-1.253)	-.028 (-2.391)	16.067 (2.458)	-155.466 (-6.033)	27.937 (6.989)	-111.117 (-2.201)	16.081 (1.834)	-.116 (-1.069)	1821.575	1606	.135	470.546	22.689
23	-.111 (-2.188)	-111.590 (-6.524)	439.097 (2.381)	.002 (.155)	-.049 (-2.696)	22.008 (2.605)	-109.952 (-2.633)	31.424 (5.579)	-25.712 (-.362)	8.115 (.654)	-.021 (.-141)	1828.644	757	.101	458.249	7.642
24	-.092 (-6.304)	-94.748 (-16.170)	471.495 (7.155)	-.020 (-3.731)	-.029 (-3.035)	14.165 (2.663)	-162.136 (-7.881)	22.931 (7.244)	-129.629 (-3.239)	28.536 (4.026)	-.284 (-3.247)	1646.485	2806	.136	488.402	40.059
25	-.129 (-2.589)	-128.378 (-8.742)	717.876 (3.956)	-.021 (-1.740)	-.025 (-1.352)	15.449 (1.176)	-128.841 (-2.677)	27.637 (3.587)	-140.273 (-1.564)	10.573 (.671)	-.050 (-.257)	1979.438	484	.197	444.220	10.515
26	-.022 (-.772)	135.965 (-12.566)	78.598 (1.082)	.004 (.484)	-.015 (-1.192)	7.026 (1.250)	-159.536 (-6.182)	27.397 (6.391)	-166.262 (-3.966)	16.889 (1.954)	-.203 (-1.907)	1939.906	1845	.113	518.952	21.180
27	-.034 (-.536)	-164.332 (-7.922)	-47.148 (-.228)	.002 (.114)	.016 (.740)	10.375 (1.083)	-7.151 (-.130)	31.008 (4.506)	5.318 (.063)	23.892 (1.597)	-.250 (-1.381)	1613.334	426	.175	415.389	8.008
28	-.054 (-4.476)	-108.063 (-20.596)	331.572 (7.255)	.018 (3.808)	-.023 (-2.900)	10.238 (2.518)	-203.920 (-11.732)	28.920 (11.416)	-122.380 (-4.366)	28.884 (5.374)	-.319 (-4.782)	1690.374	4912	.132	506.895	67.761
29	-.086 (-6.583)	-109.179 (-2.1458)	471.175 (9.650)	-.018 (-3.678)	.021 (.516)	16.956 (3.448)	-188.558 (-10.456)	26.517 (10.262)	-98.433 (-3.105)	29.895 (5.095)	-.315 -4.254)	1662.332	4658	.141	519.949	69.565
30	-.051 (-3.286)	-92.117 (-7.878)	287.244 (6.088)	-.011 (-1.273)			-135.722 (-3.782)	20.153 (3.938)	-31.969 (-.624)	22.174 (2.264)	-.203 (-1.716)	1703.542	1086	.112	500.547	15.061
31	-.061 (-4.421)	-112.763 (-22.299)	325.650 (7.128)	-.014 (-2.916)	-.023 (-3.042)	6.994 (1.619)	-199.743 (-11.581)	28.317 (11.486)	-160.956 (-5.477)	27.268 (4.632)	-.296 (-4.010)	1744.540	4958	.138	510.676	71.810
32	-.089 (-4.698)	-93.264 (-14.657)	449.954 (5.954)			10.877 (1.531)	-177.904 (-6.068)	27.995 (7.496)	-76.943 (-1.620)	25.438 (2.877)	-.272 (-2.492)	1714.076	2129	.139	519.963	38.007

Table B-3B (continued)

Demographic Group	Y_f^f	W_h	T_h	E_s	E_o	D_h	R_h	S_h	K_h	A_h	A_h^2	Constant	# Observations	R^2	Std. Error	F
33	.-079 (-1.113)	-252.222 (-11.989)	181.690 (1.184)	-.057 (-2.254)	-.061 (-2.058)	33.844 (4.454)	-209.621 (-5.814)	23.585 (5.177)	-242.529 (-4.298)	50.821 (3.915)	-.644 (-3.925)	1438.119	1174	.156	570.398	19.576
34	-.079 (-4.988)	-115.994 (-21.995)	427.178 (8.145)	-.014 (-2.715)	-.010 (-1.134)	4.935 (1.073)	-204.370 (-11.222)	29.382 (11.415)	-137.699 (-4.263)	28.213 (4.263)	-.308 (-3.652)	1733.052	4409	.150	509.834	70.359
35	-.043 (-.749)	-241.634 (-10.857)	321.869 (1.992)	-.055 (-1.992)	-.037 (-1.809)	20.108 (2.425)	-198.587 (-5.131)	25.886 (4.391)	-247.016 (-4.077)	38.591 (2.700)	-.458 (-2.543)	1673.036	998	.143	557.803	14.913
36	-.067 (-5.988)	-107.614 (-22.670)	360.798 (8.544)	-.019 (-4.528)	-.020 (-2.553)	10.764 (2.779)	-185.296 (-11.596)	26.239 (11.418)	-126.721 (-4.809)	27.915 (5.420)	-.297 (-4.639)	1707.161	5598	1131	508.943	76.214
37	-.060 (-5.534)	-108.997 (-23.752)	351.648 (8.932)	-.018 (-4.470)	-.025 (-3.343)	11.311 (3.072)	-188.296 (-12.333)	26.860 (12.287)	-129.236 (-5.115)	24.670 (5.010)	.263 (4.322)	1781.330	6012	.135	503.468	85.004
38	-.049 (-4.571)	-108.759 (-23.716)	318.117 (8.116)	-.017 (-4.299)	-.016 (-2.120)	10.649 (2.865)	-183.312 (-11.941)	25.773 (11.756)	-65.731 (-2.429)	24.643 (4.976)	-.265 (-4.316)	1802.675	5751	.131	494.335	78.716
39	-.097 (-4.769)	-92.592 (-5.117)	606.568 (7.047)				-113.788 (-2.293)	30.248 (4.888)	-252.820 (-2.852)	61.388 (4.288)	-.643 (-3.683)	710.494	611	.214	563.555	20.475

Table B-4A

ESTIMATED WAGE RATE COEFFICIENTS FOR A NONLINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE, INCOME COEFFICIENTS FOR ACCRUED NONEMPLOYMENT INCOME AND COEFFICIENTS FOR RELATIVE PREFERENCES AND FOR OTHER ECONOMIC AND DEMOGRAPHIC CONTROL VARIABLES -- SELECTED DEMOGRAPHIC GROUPS ONLY

(Definitions of the variable symbols used in the column headings of this Table are found in Table A-2)

Demographic Group	Y_f^a	W_h	W_h^o	P_h	E_s	E_o	D_h	R_h	S_h	K_h	A_h	A_h^2	Constant	# Observations	R^2	Std. Error	F
2	-.067	-72.137	-26.653	546.401	-.017	-.026	12.238	-192.046	27.753	134.777	30.751	-0.316	1597.305	6044	.134	508.990	78.050
	(-6.561)	(-5.219)	(-2.394)	9.611	(-4.054)	(-3.454)	(3.290)	(-12.421)	(12.477)	(-5.276)	(6.182)	(-5.149)					
7	-.093	-52.632	-46.829	740.854	-.025	-.026	18.696	-176.786	28.694	-141.756	34.086	-.340	1524.372	3953	.146	10.724	56.124
	(-7.301)	(-2.993)	(-3.166)	(9.342)	(-4.960)	(-2.732)	(3.529)	(-6.280)	(10.032)	(-4.411)	(5.414)	(-4.357)					
28	-.054	-68.555	-29.972	457.919	-.017	-.025	10.456	-208.751	30.147	-127.613	31.642	-.342	1583.970	4912	.134	506.425	63.071
	(-4.657)	(-4.430)	(-2.453)	(7.173)	(-3.608)	(-3.066)	(2.572)	(-11.942)	(11.827)	(-4.552)	(5.856)	(-5.117)					
29	-.110	-69.627	-28.175	832.314	-.017	.023	17.679	-190.618	28.305	-99.580	34.775	-.345	1502.039	4658	.147	18.304	66.717
	(-8.122)	(-4.429)	(-2.188)	(10.771)	(-1.683)	(.564)	(3.606)	(-10.564)	(10.903)	(-3.147)	(5.909)	(-4.663)					
31	-.056	-64.257	-38.550	487.002	-.013	-.025	6.996	-203.723	29.302	-168.381	30.709	-.328	1624.308	4958	.140	509.982	67.212
	(-4.676)	(-4.223)	(-3.110)	(7.241)	(-2.696)	(-3.214)	(1.621)	(-11.778)	(11.835)	(-5.730)	(5.197)	(-4.441)					
32	-.096	-47.054	-36.404	782.197			11.330	-183.047	29.047	29.271	-84.835	30.507	1555.775	2128	.146	18.077	36.101
	(-5.778)	(-2.092)	(1.863)	(7.238)			(1.600)	(-5.244)	(7.816)	(-1.791)	(3.447)	(-2.834)					
34	-.087	-57.466	-45.651	723.642	-.013	-.013	5.157	-209.337	30.976	-145.373	32.525	-.341	1582.308	4409	.155	508.213	67.332
	(-6.153)	(-3.585)	(-3.486)	(8.870)	(-2.463)	(-1.381)	(1.124)	(-11.489)	(11.891)	(-4.511)	(4.904)	(-4.057)					
37	-.060	-75.299	-24.947	507.046	-.018	-.026	11.669	-191.091	28.008	-133.434	27.617	-.286	1675.709	6012	.369	503.023	79.029
	(-5.900)	(-5.499)	(-2.261)	(8.977)	(-4.320)	(-3.503)	(3.170)	(-12.468)	(12.724)	(-5.279)	(5.580)	(-4.696)					
38	-.053	-73.887	-26.386	459.790	-.017	-.017	11.054	-186.822	26.910	-69.929	27.336	-.285	1701.671	5741	.133	493.815	73.398
	(-5.131)	(-5.370)	(-2.377)	(8.124)	(-4.114)	(-2.285)	(2.975)	(-12.127)	(12.189)	(-2.585)	(5.493)	(-4.644)					

Table B-4B

ESTIMATED WAGE RATE COEFFICIENTS FOR A NONLINEAR RELATION BETWEEN HOURS OF WORK AND THE WAGE RATE, INCOME COEFFICIENTS FOR NONEMPLOYMENT INCOME FLOWS AND COEFFICIENTS FOR RELATIVE PREFERENCES AND FOR OTHER DEMOGRAPHIC CONTROL VARIABLES -- SELECTED DEMOGRAPHIC GROUPS ONLY

(Definitions of the variable symbols used in the column headings of this Table are found in Table A-2)

Demographic Group	Y_f^f	W_h	W_h^o	P_h	E_s	E_o	D_h	R_h	S_h	K_h	A_h	A_h^2	Constant	# Observations	R^2	Std. Error	F
2	-.066	-73.692	-29.560	371.723	-.017	-.024	11.692	-193.571	27.086	-133.948	28.344	-.301	1664.573	6044	.134	509.224	77.517
	(-6.121)	(-5.329)	(-2.660)	(9.363)	(-4.030)	(-3.292)	(3.143)	(-12.501)	(12.210)	(-5.240)	(5.718)	(-4.893)					
7	-.069	-53.914	-51.584	415.211	-.024	-.023	,7.528	-181.255	27.733	-143.135	30.493	-.325	1623.656	3953	.141	512.123	54.026
	(-5.613)	(-3.057)	(-3.485)	(7.970)	(-4.797)	(-2.452)	(3.301)	(-6.420)	(9.690)	(-4.442)	(4.849)	(-4.153)					
28	-.052	-69.811	-32.417	325.935	-.017	-.023	10.040	-209.526	29.481	-126.234	29.776	-.330	1628.535	4912	.133	506.581	62.781
	(-4.318)	(-4.561)	(-2.660)	(7.128)	(-3.631)	(-2.904)	(2.470)	(-11.974)	(11.605)	(-4.500)	(5.532)	(-4.936)					
29	-.085	-70.327	-33.538	468.635	-.017	.023	16.954	-193.273	27.177	-102.401	30.680	-.324	1611.508	4658	.143	19.625	64.413
	(-6.485)	(-4.462)	(-2.604)	(9.602)	(-3.458)	(.552)	(3.450)	(-10.671)	(10.473)	(-3.228)	(5.225)	(-4.375)					
31	-.059	-65.277	-40.923	321.618	₹.013	-.024	6.612	-206.131	29.136	-166.738	28.518	-.311	1677.731	4958	.140	510.164	66.869
	(-4.279)	(-4.289)	(-3.225)	(7.044)	(-2.701)	(-3.074)	(1.532)	(-11.889)	(11.771)	(-5.670)	(4.839)	(-4.203)					
32	-.087	-47.889	-41.002	446.220			10.890	-183.890	28.923	-82.300	26.246	-.280	1659.782	2129	.141	519.547	34.700
	(-4.608)	(-2.123)	(-2.096)	(5.908)			(1.534)	(-6.247)	(7.696)	(-1.732)	(2.967)	(-2.566)					
34	-.076	-58.136	-49.902	422.738	-.013	-.011	4.426	-211.712	30.688	-143.655	29.766	-.326	1651.193	4409	.152	509.050	65.907
	(-4.827)	(-3.621)	(-3.815)	(8.071)	(-2.443)	(-1.184)	(.964)	(-11.579)	(11.759)	(-4.448)	(4.496)	(-3.867)					
37	-.059	-76.680	-27.575	349.206	-.017	-.025	11.178	-192.374	27.394	-132.744	25.438	-.272	1736.563	6012	.136	503.247	78.512
	(-5.424)	(-5.599)	(-2.504)	(8.871)	(-4.294)	(-3.356)	(3.036)	(-12.534)	(12.478)	(-5.248)	(5.159)	(-4.464)					
38	-.048	-75.008	-28.820	316.132	-.017	-.016	10.568	-187.513	26.337	-69.172	25.428	-.274	1755.940	5751	.132	494.087	72.792
	(-4.471)	(-5.450)	)-2.601)	(8.068)	(-4.091)	(-2.145)	(2.844)	(-12.154)	(11.961)	(-2.555)	(5.127)	(-4.459)					

Table B-5A

ESTIMATES OF DIFFERENTIAL EFFECTS ON HOURS OF WORK OF THE COMPONENTS OF ACCRUED NONEMPLOYMENT INCOME

Demographic Group	Accrued Nonemployment Income Coefficient (Y_f^a)	Wage Coefficient (W_h)	Estimated Differential Effects of Components: Consumer Debt (DY_f^a)	Transfer Payments (TR_f^a)	Liquid Assets (LY_f^a)	Imputed Income From Business or Farm (BY_f^a)	# Observations	R^2	Standard Error	F
1	-.043 (-3.010)	-105.263 (-21.483)	-.211 (-2.999)	-.086 (-3.864)	.006 (.358)	-.018 (-.618)	7093	.124	545.724	66.795
2	-.048 (-3.417)	-106.727 (-21.934)	-.149 (-2.124)	-.075 (-3.327)	.009 (.549)	.033 (1.097)	6044	.136	508.564	63.418
3	.023 (.564)	-117.982 (-11.530)	-.126 (-1.334)	-.109 (-1.884)	.270 (2.244)	.206 (1.328)	1797	.092	466.396	12.854
4	.328 (1.559)	-180.223 (-5.621)	-.925 1.819	-.854 (-3.552)	-.571 (-2.103)	-.111 (-.202)	498	.144	601.085	5.413
5	.004 (.170)	-116.350 (-7.476)	-.321 .761	-.037 (-.800)	.051 (1.002)	.091 (1.084)	650	.136	492.698	6.661
6	-.066 (-4.036)	-105.762 (-20.930)	-.141 1.998	-.063 (-2.473)	.009 (.517)	.013 (.411)	4896	.149	497.684	56.818
7	-.079 (-4.420)	-108.295 (-19.296)	-.219 2.109	-.057 (-2.122)	.013 (.746)	-.256 (-.696)	3953	.146	510.827	44.975
8	-.002 (-.055)	-110.440 (-10.964)	-.096 (-1.013)	-.074 (-1.573)	-.010 (-.152)	.162 (3.025)	2091	.110	501.797	17.022
9	-.072 (-1.225)	-113.527 (-5.596)	.134 (.531)	-.042 (-487)	.113 (1.346)	-.082 (-.930)	538	.164	521.955	6.856

Table B-5A (continued)

	Estimated Differential Effects of Components									
	Accrued Nonemployment Income Coefficient (Y_f^a)	Wage Coefficient (W_h)	Consumer Debt (DY_f^a)	Transfer Payments (TR_f^a)	Liquid Assets (LY_f^a)	Imputed Income From Business or Farm (BY_f^a)	# Observations	R^2	Standard Error	F
10	.037 (1.197)	-179.538 (-9.817)	-.096 (-362)	-.104 (-1.719)	.047 (.615)	.019 (.344)	1101	.143	560.585	12.054
11	-.142 (-5.065)	-93.805 (-14.135)	-.216 (-1.603)	.023 (.583)	-.011 (-.468)	.021 (.297)	1944	.155	497.085	23.570
12	-.059 (-2.293)	-110.663 (-12.667)	-.166 (-1.867)	-.090 (-2.326)	.013 (.485)	.133 (2.153)	2460	.141	481.275	26.829
13	.093 (1.149)	-199.538 (-6.665)	-.728 (-1.938)	-.162 (-1.361)	.391 (1.981)	.040 (.237)	275	.239	428.097	5.818
14	-.062 (-.458)	-80.026 (-2.518)	-.626 (-1.379)	.070 (.395)	.235 (1.443)	.170 (.674)	224	.120	505.823	2.029
15	-.010 (-.118)	-146.031 (-8.570)	-.030 (-297)	-.097 (-962)	.574 (1.489)	-.557 (-.406)	688	.131	421.726	7.265
16	-.059 (-1.281)	-142.559 (-8.676)	-.390 (-1.570)	-.135 (-2.029)	.001 (.032)	-.001 (-.105)	718	.187	520.297	11.560
17	-.099 (-1.293)	-90.853 (-4.053)	-.086 (-.303)	-.036 (-.318)	-.116 (-721)	-1.142 (-1.425)	356	.126	412.209	3.519
18	-.071 (-2.583)	-118.098 (-13.376)	-.189 (-1.279)	-.075 (-1.826)	.062 (1.155)	-.002 (-.032)	2368	.146	523.077	26.898
19	-.157 (-1.851)	-84.895 (-3.877)	-.054 (-221)	.104 (.883)	.299 (1.821)	-.049 (-.592)	500	.123	556.663	4.867

Table B-5A (continued)

	Estimated Differential Effects of Components									
	Accrued Nonemployment Income Coefficient (Y_f^a)	Wage Coefficient (W_h)	Consumer Debt (DY_f^a)	Transfer Payments (TR_f^a)	Liquid Assets (LY_f^a)	Imputed Income From Business or Farm (BY_f^a)	# Observations	R^2	Standard Error	F
20	.044 (.187)	-194.734 (-2.810)	-.950 (-.840)	-.144 (-.479)	2.142 (1.317)	.033 (.000)	282	.064	607.947	1.298
21	-.165 (-4.498)	-82.057 (-10.989)	-.373 (-1.848)	.030 (.602)	-.018 (-424)	-.000 (-.000)	1200	.160	502.842	15.048
22	-.050 (-1.637)	-120.823 (-10.793)	-.078 (-.820)	-.117 (-2.440)	.012 (.425)	.323 (2.892)	1606	.143	469.076	17.677
23	-.008 (-.118)	-135.691 (-7.152)	-.067 (-.641)	-.088 (-.883)	.358 (2.841)	.425 (3.069)	757	.121	454.331	6.828
24	-.100 (-4.902)	-88.991 (-14.544	-.130 (-1.492)	-.050 (-1.591)	.019 (.863)	.119 (1.811)	2806	.145	486.187	31.613
25	-.061 (-1.332)	-132.618 (-8.245)	-1.372 (-3.063)	-.132 (-1.341)	.185 (2.170)	.240 (2.190)	484	225	438.290	9.045
26	.063 (2.192)	-147.285 (-12.990)	-.112 (-1.012)	-.131 (-2.711)	.033 (.465)	.058 (.465)	1845	.118	518.105	16.249
27	-.023 (-.200)	-171.780 (-8.144)	.021 (.192)	.034 (.247)	.757 (2.474)	4.835 (1.854)	430	.194	412.793	6561
28	-.052 (-3.322)	-104.977 (-19.051)	-.248 (-2.479)	-.033 (-1.245)	.010 (.592)	.066 (1.638)	4912	.135	506.305	50.835
29	-.087 (-4.762)	-105.443 (-19.966)	-.151 (-1.958)	-.092 (-3.170)	.012 (.669)	.054 (1.521)	4658	.149	517.732	54.377
30	-.024 (-1.471)	-97.983 (-8.163)	-.205 (-.809)	-.209 (-4.444)	.016 (.387)	.177 (2.801)	1086	.132	495.827	12.517

Table B-5A (continued)

	Estimated Differential Effects of Components									
	Accrued Nonemployment Income Coefficient (Y_f^a)	Wage Coefficient (W_h)	Consumer Debt (DY_f^a)	Transfer Payments (TR_f^a)	Liquid Assets (LY_f^a)	Imputed Income From Business or Farm (BY_f^a)	# Observations	R^2	Standard Error	F
31	-.036 (-2.053)	-111.768 (-21.008)	-.146 (-1.997)	-.065 (-2.469)	.003 (.176)	.002 (.071)	4958	.140	510.068	53.840
32	-.083 (-3.127)	-90.021 (-13.598)	-.173 (-1.670)	-.073 (-1.950)	.022 (.814)	.026 (.503)	2129	.148	517.620	28.338
33	.122 (.912)	-264.570 (-11.940)	-.287 (-2.018)	-.278 (-1.703)	.559 (1.092)	-.726 (-1.587)	1174	.163	569.278	14.984
34	-.080 (-3.721)	-111.656 (-20.132)	-.158 (-2.101)	-.031 (-1.010)	.002 (.077)	-.012 (-.329)	4409	.154	508.762	53.318
35	.196 (1.373)	-267.049 (-10.895)	-.338 (-.967)	-.290 (-1.859)	2.236 (2.167)	.052 (.032)	998	.151	556.290	11.620
36	-.039 (-2.603)	-107.097 (-21.544)	-.136 (-1.924)	-.095 (-3.952)	.008 (.468)	.033 (1.058)	5597	.134	507.957	57.821
37	-.047 (-3.423)	-106.909 (-22.201)	-.147 (-2.125)	-.056 (-2.474)	.010 (.607)	.034 (1.147)	6012	.138	502.797	63.839
38	-.049 (3.552)	-105.881 (22.021)	-.135 (-1.960)	-.028 (-1.229)	.010 (.643)	.032 (1.072)	5750	.133	493.867	58.826
39	-.022 (-.414)	-94.611 (-5.004)	-.863 (-1.404)	-.178 (-1.467)	.029 (.352)	-.146 (-1.148)	611	.220	563.068	14.094

Table B-5B

ESTIMATES OF DIFFERENTIAL EFFECTS ON HOURS OF WORK OF THE COMPONENTS OF NONEMPLOYMENT INCOME FLOWS

Demographic Group	Nonemployment Income Flows Coefficient (Y_f^f)	Wage Coefficient (W_h)	Estimated Differential Effects of Components: Consumer Debt (DY_f^f)	Liquid Assets (LY_f^f)	Transfer Payments (TR_f^f)	# Observations	R^2	Standard Error	F
1	-.013 (-.858)	-110.845 (-23.652)	-.444 (-5.474)	-.010 (-.217)	-.117 (-5.161)	7093	.126	545.171	72.668
2	-.024 (-1.799)	-111.814 (-23.957)	-.356 (-4.393)	-.003 (-.070)	-.097 (-4.177)	6044	.139	507.885	64.664
3	-.075 (-1.394)	-114.609 (-11.593)	-.469 (-2.583)	.588 (2.255)	-.020 (-.288)	1797	.094	465.756	14.181
4	.113 (5.67)	-175.919 (-5.695)	-2.010 (-4.201)	-.674 (-1.842)	-.658 (-2.915)	498	.170	591.380	7.060
5	-.007 (-.221)	-112.824 (-7.593)	-.895 (-2.085)	.092 (.994)	-.027 (-.530)	650	.138	491.719	7.274
6	-.025 (-1.583)	-111.686 (-22.868)	-.254 (-2.062)	-.008 (-.164)	-.103 (-3.995)	4895	.147	498.085	60.145
7	-.026 (-1.614)	-115.821 (-21.452)	-.448 (-4.033)	.001 (.000)	-.109 (-4.124)	3953	.145	11.086	47.783
8	-.034 (-.930)	-108.671 (-11.336)	-.236 (-1.961)	-.014 (-.089)	-.045 (-.857)	2091	.108	502.204	17.897
9	-.015 (-.176)	-123.616 (-6.558)	-.475 (-1.535)	.126 (-.888)	-.098 (-887	539	.164	521.674	7.323
10	.037 (1.108)	-175.921 (-9.855)	-.099 (-.582)	.135 (.843)	-.107 (-1.740)	1101	.142	560.699	12.807
11	-.028 (-1.443)	-100.736 (-15.369)	-.365 (2.575)	-.080 (-1.297)	-.091 (-2.720)	1944	.148	499.039	23.909

Table B-5B (continued)

	Nonemployment Income Flows Coefficient (Y_f^f)	Wage Coefficient (W_h)	Estimated Differential Effects of Components: Consumer Debt (DY_f^f)	Liquid Assets (LY_f^f)	Transfer Payments (TR_f^f)	# Observations	R^2	Standard Error	F
12	-.050 (-1.600)	-118.469 (-14.897)	-.492 (-3.649)	.016 (.207)	-.098 (-2.254)	2460	.143	480.634	29.216
13	-.018 (-.214)	-171.150 (-6.438)	-.926 (-2.363)	.454 (1.385)	-.057 (-.467)	275	.225	431.045	5.830
14	-.105 (-.927)	-81.233 (-2.795)	-.846 (-1.581)	.543 (1.270)	.121 (.711)	224	.125	503.039	2.311
15	-.166 (-1.704)	-141.020 (-8.592)	-.345 (-1.277)	.752 (1.125)	.038 (.344)	688	.136	420.196	8.182
16	.032 (.669)	-158.097 (-11.005)	-.630 (-2.757)	-.108 (-1.059)	-.223 (-3.237)	718	.191	518.835	12.748
17	-.076 (-.572)	-99.761 (-4.592)	.032 (.089)	.065 (.134)	-.064 (-.414)	356	.119	413.271	3.558
18	-.020 (-.633)	-122.948 (-14.463)	-.321 (-2.571)	-.024 (-.253)	-.127 (-2.898)	2368	.146	523.038	28.777
19	.010 (.134)	-96.155 (-4.700)	-.149 (-.780)	.195 (.618)	-.063 (-.576)	500	.113	559.186	4.781
20	.199 (.733)	-203.398 (-3.045)	-.251 (-.226)	12.202 (2.168)	-.296 (-.872)	281	.069	605.180	1.522
21	-.038 (-1.484)	-89.500 (-12.034)	-.657 (-3.123)	-.081 (-1.157)	-.100 (-2.433)	1200	.154	504.479	15.399
22	(-.045 (-1.250)	-126.111 (-12.422)	-.416 (-2.493)	.022 (.259)	-.121 (-2.283)	1606	.141	469.391	18.691

Table B-5B (continued)

	Nonemployment Income Flows Coefficient (Y_f^f)	Wage Coefficient (W_h)	Estimated Differential Effects of Components: Consumer Debt (DY_f^f)	Liquid Assets (LY_f^f)	Transfer Payments (TR_f^f)	# Observations	R^2	Standard Error	F
23	-.114 (-1.527)	-118.010 (-6.793)	-.281 (-.991)	.791 (2.278)	.010 (.095)	757	.109	457.167	6.499
24	-.044 (-2.322)	-98.225 (-16.688)	-.515 (-3.933)	-.061 (-1.147)	-.105 (-3.389)	2806	.144	486.515	33.485
25	-.111 (-1.741)	-131.810 (-8.737)	-.157 (-.522)	.178 (1.299)	-.085 (-.778)	484	.202	444.266	8.468
26	.049 (1.171)	-141.895 (-12.937)	-.634 (-2.861)	-.025 (-.184)	-.121 (-2.143)	1845	.118	517.795	17.516
27	-.109 (.981)	-168.740 (-8.096)	-.231 (-.616)	1.147 (1.652)	.116 (.868)	426	.184	414.855	6.599
28	-.031 (-1.980)	-110.497 (-20.942)	-.422 (-4.325)	-.010 (-.214)	-.055 (-2.047)	4912	.136	505.963	54.942
29	-.039 (-2.343)	-112.425 (-21.991)	-.300 (-3.308)	-.009 (-.176)	-.136 (-4.771)	4658	.147	518.413	57.166
30	-.023 (-1.371)	-98.971 (-8.452)	-.448 (-2.399)	.001 (.000)	-.206 (-4.357)	1086	.131	495.801	13.488
31	-.004 (-.182)	-116.320 (-22.761)	-.343 (-3.769)	-.005 (-.089)	-.098 (-3.188)	4958	.142	509.720	58.175
32	-.011 (-.371)	-98.141 (-15.277)	-.693 (-3.493)	-.034 (-.511)	-.141 (-3.410)	2129	.148	517.712	30.542
33	.066 (.572)	-266.482 (-12.517)	-.998 (-2.920)	2.469 (2.060)	-.221 (-1.428)	1174	.167	567.688	16.537

Table B-5B (continued)

	Nonemployment Income Flows Coefficient (Y_f^f)	Wage Coefficient (W_h)	Estimated Differential Effects of Components: Consumer Debt (DY_f^f)	Liquid Assets (LY_f^f)	Transfer Payments (TR_f^f)	# Observations	R^2	Standard Error	F
34	-.025 (-.940)	-119.007 (-22.339)	-.346 (-3.673)	-.019 (-.326)	-.086 (-2.439)	4408	.153	509.044	56.644
35	.074 (.632)	-260.017 (-11.460)	-.726 (-2.012)	5.443 (2.827)	-.186 (-1.334)	998	.155	554.754	12.837
36	-.022 (-1.482)	-111.063 (-23.268)	-.341 (-4.024)	-.003 (-.071)	-.113 (-4.673)	5598	.136	507.518	62.677
37	-.026 (-1.799)	-111.864 (-24.211)	-.349 (-4.352)	-.006 (-.141)	-.078 (-3.361)	6012	.139	502.462	68.989
38	-.027 (-1.903)	-110.992 (-24.028)	-.328 (-4.107)	.005 (.122)	-.050 (-2.134)	5750	.134	493.616	63.437
39	-.013 (-.110)	-99.726 (-5.468)	-1.877 (-3.039)	.019 (.095)	-.191 (-1.181)	611	.227	560.084	16.029

Appendix C

ESTIMATES OF PROGRAM IMPACTS USING THE UPPER BOUND PROCEDURE

Table C-1A

ESTIMATED AGGREGATE IMPACT OF PROGRAM USING THE UPPER BOUND PROCEDURE AND THE INTERMEDIATE SUBSTITUTION AND INCOME EFFECT ESTIMATES (ϵ^s = .20 and C^y = -.10)

Simulated Programs	Number Program Participants (thousands)		Total Subsidy ($ millions)		Total Production Loss ($ millions)		Total Welfare Cost ($ millions)		Hours Reduction as a Percent of all Hours Worked by Sample Population		Production Loss as a Percent of Total Earnings of Sample Population		Hours Reduction as a Percent of All Hours Worked by Labor Force		Production Loss as a Percent of Total Earnings of Labor Force	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
PC FAP,FSP	4949.	7333.	5139.4	7614.0	2985.9	4423.7	507.7	752.1	1.98	2.93	1.20	1.77	0.93	1.38	0.63	0.93
C=$400+$300·N																
m = .5																
FAP+FSP	3175.	4799.	4694.2	7094.9	2141.5	3236.6	425.4	643.0	1.59	2.40	0.86	1.30	0.75	1.13	0.45	0.68
FSP	3768.	4272.	619.8	702.6	918.0	1040.7	65.8	74.6	0.48	0.55	0.37	0.42	0.23	0.26	0.19	0.22
m = .25																
FAP+FSP	8556.	9787.	9588.2	10968.7	5357.4	6128.7	655.8	750.2	3.11	3.56	2.14	2.45	1.47	1.69	1.12	1.29
m = .75																
FAP+FSP	1504.	2863.	2790.4	5313.3	939.3	1738.6	283.1	539.1	0.91	1.74	0.38	0.72	0.43	0.82	0.20	0.38
FSP	4579.	5238.	1259.7	1441.1	1163.1	1330.5	75.2	86.0	0.65	0.75	0.47	0.53	0.31	0.35	0.24	0.28
C=$500+$750·M																
m = .5																
FAP+FSP	10553.	11963.	22468.5	25471.2	11320.3	12333.2	2035.6	2307.7	6.32	7.16	4.53	5.14	2.98	3.38	2.37	2.69
m = .25																
FAP+FSP	14321.	15218.	34907.2	37092.4	15011.6	15951.4	1306.6	1388.4	7.57	8.04	6.01	6.39	3.57	3.79	3.15	3.35
m = .75																
FAP+FSP	7445.	9516.	15308.8	17512.8	8121.4	9290.6	2357.0	2696.4	5.17	5.91	3.25	3.72	2.44	2.79	1.70	1.95

Notes for table follow Table 13C.

Table C-1B

ESTIMATED AGGREGATE IMPACT OF PROGRAM
USING THE UPPER BOUND PROCEDURE AND THE LOW SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .10 and c^y = -.09)

Simulated Programs	Number Program Participants (thousands)		Total Subsidy ($ millions)		Total Production Loss ($ millions)		Total Welfare Cost ($ millions)		Hours Reduction as a Percent of all Hours Worked by Sample Population		Production Loss as a Percent of Total Earnings of Sample Population		Hours Reduction as a Percent of All Hours Worked by Labor Force		Production Loss as a Percent of Total Earnings of Labor Force	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
PC FAP,FSP	4410.	6533.	4572.4	6774.0	1604.7	2377.3	217.9	322.9	1.10	1.63	0.64	0.95	0.52	0.77	0.34	0.50
C=$400+$300·N																
m = .5																
FAP+FSP	2705.	4088.	4001.5	6047.8	1109.3	1676.7	170.7	257.9	0.87	1.32	0.44	0.67	0.41	0.62	0.23	0.35
FSP	3169.	3593.	590.2	669.0	453.6	514.3	27.7	31.4	0.24	0.27	0.18	0.21	0.11	0.13	0.10	0.11
m = .25																
FAP+FSP	8064.	9225.	8817.3	10086.8	3183.0	3641.3	304.0	347.7	1.90	2.17	1.27	1.46	0.90	1.02	0.67	0.76
m = .75																
FAP+FSP	1196.	2277.	2233.0	4251.8	429.1	817.1	101.4	193.1	0.46	0.88	0.17	0.33	0.22	0.42	0.09	0.17
FSP	4671.	5344.	1375.7	1573.7	703.6	804.9	38.3	43.9	0.41	0.47	0.28	0.32	0.19	0.22	0.15	0.17
C=$500+$750·M																
m = .5																
FAP+FSP	9616.	11128.	19950.4	22616.6	6657.3	7547.0	921.9	1045.1	3.86	4.37	2.67	3.02	1.82	2.06	1.40	1.58
m = .25																
FAP+FSP	14028.	14907.	33159.5	35235.4	10406.7	11058.1	634.4	674.1	5.32	5.65	4.17	4.43	2.51	2.66	2.18	2.32
m = .75																
FAP+FSP	6247.	7146.	12575.4	14385.9	3925.4	4490.5	930.8	1064.8	2.74	3.13	1.57	1.80	1.29	1.48	0.82	0.94

Notes for table follow Table 13C.

Table C-1C

ESTIMATED AGGREGATE IMPACT OF PROGRAM
USING THE UPPER BOUND PROCEDURE AND THE HIGH SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s - .25 and ϵ^y = -.11)

Simulated Programs	Number Program Participants (thousands)		Total Subsidy ($ millions)		Total Production Loss ($ millions)		Total Welfare Cost ($ millions)		Hours Reduction as a Percent of all Hours Worked by Sample Population		Production Loss as a Percent of Total Earnings of Sample Population		Hours Reduction as a Percent of All Hours Worked by Labor Force		Production Loss as a Percent of Total Earnings of Labor Force	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
PC FAP,FSP	5261.	7794.	5484.5	8125.3	3845.1	5696.6	635.7	1017.3	2.53	3.74	1.54	2.28	1.19	1.77	0.81	1.19
C=$400+$300·N																
m = .5																
FAP+FSP	3391.	5125.	5090.0	7693.0	2795.7	4225.4	578.6	874.4	2.03	3.07	1.12	1.69	0.96	1.45	0.59	0.89
FSP	2760.	3129.	443.3	502.5	833.1	944.4	60.3	68.3	0.43	0.49	0.33	0.38	0.20	0.23	0.17	0.20
m = .25																
FAP+FSP	8832.	10104.	10040.4	11486.0	6653.1	7611.0	856.1	979.4	3.84	4.39	2.66	3.05	1.81	2.07	1.40	1.60
m = .75																
FAP+FSP	1690.	3011.	3148.5	5610.5	1336.8	2382.1	416.7	742.5	1.25	2.23	0.54	0.95	0.59	1.05	0.28	0.50
FSP	4452.	5093.	1196.8	1369.1	1384.5	1583.8	91.3	104.5	0.76	0.87	0.55	0.63	0.36	0.41	0.29	0.33
C=$500+$750·M																
m = .5																
FAP+FSP	10964.	12429.	23983.0	27188.1	14276.4	16184.3	2579.2	3037.3	7.84	8.89	5.72	6.48	3.70	4.19	2.99	3.39
m = .25																
FAP+FSP	14449.	15353.	35974.2	38226.2	17872.3	18991.1	1652.6	1756.1	8.95	9.51	7.16	7.60	4.22	4.48	3.75	3.98
m = .75																
FAP+FSP	7962.	9109.	17083.0	19542.5	10905.3	12475.4	3226.4	3690.9	6.70	7.66	4.37	4.99	3.16	3.61	2.29	2.62

Notes for table follow Table 13C.

Table C-2A

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT
USING THE UPPER BOUND PROCEDURE AND THE INTERMEDIATE SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .20 and ϵ^y = -.10)

Simulated Programs	Pre-Program Hours	Hours Reduction: Mean Hrs. Reduction	Hours Reduction: Percent Attributable to: Subs. Effect	Hours Reduction: Percent Attributable to: Income Effect	Hours Reduction: Percent Change in Hours: Economic	Hours Reduction: Percent Change in Hours: Individual	Pre-Program Earnings	Production Loss: Mean Loss in Production	Production Loss: Percent Attributable to: Subs. Effect	Production Loss: Percent Attributable to: Income Effect	Production Loss: Percent Production Loss	Welfare Cost	Pre-Program Family Income	Net Change in Family Income: Total	Net Change in Family Income: Percent With Positive Change	Annual Subsidy
PC FAP,FSP	1991.	293.	68.0	32.0	14.7	15.9	4103.	603.	68.4	31.6	14.7	103.	4870.	439.	61.4	1038.
C=$400+$300·N																
m = .5																
FAP+FSP	1999.	367.	64.1	35.9	18.4	21.2	3856.	574.	63.0	37.0	17.5	134.	4319.	764.	80.4	1479.
FSP	2173.	94.	83.3	16.7	4.3	4.4	5582.	244.	82.8	17.2	4.4	17.	635.	-79.	16.3	164.
m = .25																
FAP+FSP	2130.	267.	61.5	38.5	12.5	14.0	5164.	626.	62.9	37.2	12.1	77.	5881.	488.	66.4	1121.
m = .75																
FAP+FSP	1806.	446.	63.9	36.1	24.7	29.1	2999.	625.	59.1	40.9	20.8	188.	3396.	1091.	97.5	1856.
FSP	2173.	105.	74.9	25.1	4.8	5.0	5237.	254.	74.4	25.6	4.9	16.	591.	21.	49.3	275.
C=$500+$750·M																
m = .5																
FAP+FSP	2156.	439.	57.9	42.1	20.4	22.3	5538.	1073.	59.2	40.8	19.4	193.	6369.	1028.	73.5	2129.
m = .25																
FAP+FSP	2178.	388.	43.2	56.8	17.8	19.5	6144.	1048.	44.7	55.2	17.1	91.	7286.	1380.	85.4	2437.
m = .75																
FAP+FSP	2115.	509.	66.0	34.0	24.1	26.3	5012.	1091.	66.7	33.3	21.8	317.	5631.	874.	66.9	2056.

Notes for table follow Table 14C.

Table C-2B

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT
USING THE UPPER BOUND PROCEDURE AND THE LOW SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^s = .10 and C^y = -.09)

Simulated Programs	Pre-Program Hours	Hours Reduction: Mean Hrs. Reduction	Hours Reduction: Percent Attributable to: Subs. Effect	Hours Reduction: Percent Attributable to: Income Effect	Percent Change in Hours: Economic	Percent Change in Hours: Individual	Pre-Program Earnings	Production Loss: Mean Loss in Production	Production Loss: Percent Attributable to: Subs. Effect	Production Loss: Percent Attributable to: Income Effect	Production Loss: Percent Production Loss	Welfare Cost	Pre-Program Family Income	Net Change in Family Income: Total	Net Change in Family Income: Percent With Positive Change	Annual Subsidy
FC FAP,FSP	1968.	184.	53.6	46.4	9.3	11.5	3955.	364.	53.9	46.1	9.2	49.	4723.	670.	79.0	1037.
C=$400+$300·N																
m = .5																
FAP+FSP	1972.	236.	49.1	50.9	12.0	15.0	3633.	410.	47.2	52.8	11.3	63.	4107.	1033.	99.7	1479.
FSP	2162.	55.	70.8	29.2	2.5	2.6	5492.	143.	70.3	29.7	2.6	9.	623.	45.	62.7	186.
m = .25																
FAP+FSP	2124.	173.	47.3	52.7	8.1	9.6	5080.	395.	48.8	51.2	7.8	38.	5769.	693.	79.9	1093.
m = .75																
FAP+FSP	1741.	285.	48.1	51.9	16.4	21.4	2708.	359.	41.1	58.9	13.2	85.	3153.	1392.	100.0	1867.
FSP	2160.	64.	60.5	39.6	3.0	3.1	5131.	151.	60.1	39.9	2.9	8.	579.	140.	74.6	295.
C=$500+$750·M																
m = .5																
FAP+FSP	2151.	289.	44.0	56.0	13.4	15.3	5394.	578.	45.3	54.7	12.6	94.	6211.	1332.	86.0	2032.
m = .25																
FAP+FSP	2177.	278.	30.2	69.9	12.8	14.4	6091.	742.	31.5	68.5	12.2	45.	7214.	1618.	92.3	2364.
m = .75																
FAP+FSP	2085.	321.	51.5	48.5	15.4	17.8	4719.	628.	51.8	48.2	13.3	149.	5334.	1303.	83.7	2013.

Notes for table follow Table 14C.

Table C-2C

ESTIMATED PROGRAM IMPACT UPON "AVERAGE" PARTICIPANT
USING THE UPPER BOUND PROCEDURE AND THE HIGH SUBSTITUTION AND INCOME EFFECT
ESTIMATES (ϵ^S = .25 and ϵ^Y = -.11)

Simulated Programs	Pre-Program Hours	Hours Reduction: Mean Hrs. Reduction	Hours Reduction: Percent Attributable to: Subs. Effect	Hours Reduction: Percent Attributable to: Income Effect	Hours Reduction: Percent Change in Hours: Economic	Hours Reduction: Percent Change in Hours: Individual	Pre-Program Earnings	Production Loss: Mean Loss in Production	Production Loss: Percent Attributable to: Subs. Effect	Production Loss: Percent Attributable to: Income Effect	Production Loss: Percent Production Loss	Welfare Cost	Pre-Program Family Income	Net Change in Family Income: Total	Net Change in Family Income: Percent With Positive Change	Annual Subsidy
PC	2001.	353.	71.0	29.0	17.6	19.8	4177.	731.	71.4	28.6	17.5	131.	4951.	312.	54.3	1042.
FAP,FSP																
C=$400+$300·N																
m = .5																
FAP+FSP	2002.	440.	67.0	33.0	22.0	24.8	3928.	825.	66.1	33.9	21.0	171.	4390.	632.	70.9	1501.
FSP	2182.	115.	85.4	14.6	5.3	5.4	5654.	302.	85.0	15.0	5.3	22.	645.	-139.	10.4	161.
m = .25																
FAP+FSP	2134.	319.	64.4	35.6	14.9	16.5	5224.	753.	65.8	34.2	14.4	97.	5946.	373.	59.8	1137.
m = .75																
FAP+FSP	1867.	544.	67.8	32.2	29.2	33.5	3139.	791.	63.6	36.4	25.2	247.	3526.	923.	87.5	1863.
FSP	2165.	126.	77.6	22.4	5.8	6.0	5297.	311.	77.1	22.9	5.9	21.	599.	-41.	38.7	269.
C=$500+$750·M																
m = .5																
FAP+FSP	2160.	525.	60.7	39.3	24.3	26.2	5614.	1302.	62.1	37.9	23.2	244.	6447.	856.	67.0	2187.
m = .25																
FAP+FSP	2179.	455.	46.2	53.8	20.9	22.6	6161.	1237.	47.6	52.4	20.1	114.	7322.	1244.	81.3	2490.
m = .75																
FAP+FSP	2126.	617.	68.4	31.6	29.0	31.3	5132.	1370.	69.2	30.8	26.7	405.	5760.	684.	61.1	2145.

Notes for table follow Table 14C.

Appendix D

A SIMPLE STATISTICAL APPROACH TO THE ANALYSIS OF THE INFLUENCE OF RELATIVE PREFERENCES ON ESTIMATES OF THE INCOME EFFECT

This Appendix is intended to clarify the interpretation of the role of relative preference differences in estimating the income effect on hours of work and examine possible biases that may result from imperfect relative preference measures. A model will be discussed in which all persons have the same wage rate and other characteristics influencing labor supply that are not explicitly considered. Then hours of work, H, can be regarded as a function of nonemployment income, Y, and a measure of preferences, P, where the variables are measured from their respective means. For convenience these variables will be denoted by the subscripts 1, 2, and 3 respectively. Thus:

$$H = \beta_2 Y + \beta_3 P + u$$

TYPES OF RELATIVE PREFERENCE MEASURES

Three types of preference differences will be considered, and the preference variable, P, will be considered as a measure of each in turn.

(1) Preference differences affecting the consumption-leisure margin.

(2) Preference differences affecting the asset accumulation-consumption margin (desired savings rate).

(3) Preference differences affecting the asset accumulation-leisure margin.

The influence on income effect estimates of neglecting relative preference differences of each of these types can be analyzed in terms of the effect of a left-out variable. Estimating the relation without including a relative preference variable leads to estimation of the relation:

$$H = b_2 Y + u$$

and

$$b_2 = \frac{\Sigma YH}{\Sigma Y^2} = \frac{\Sigma Y(\beta_2 Y + \beta_3 P + u)}{\Sigma Y^2}$$

Taking the expected value of b, we obtain

$$E(b_2) = \beta_2 + b_{32}\beta_3$$

where

$$b_{32} = \frac{\Sigma YP}{\Sigma Y^2} \quad .$$

Thus b_{32} is the slope coefficient from a regression of the preference measure (as the dependent variable) on nonemployment income. And β_3 is of course the (partial) effect of preferences on hours of work. If Y is uncorrelated with P, ($b_{32} = 0$), or if $\beta_3 = 0$, there is no bias in b_2 as an estimate of β_2 .

The relation above is an identity in least square coefficients of the form

$$b_{12} = b_{12.3} + b_{13.2}\, b_{32}$$

where the coefficients with three subscripts are partial regression coefficients corresponding to β_2 and β_3 above.

Now suppose the preference variable is a measure of relative preferences of type 1, current consumption versus leisure. There is no reason to expect a non-zero value for b_{32} in this case since preference differences at this margin should not affect asset accumulation, the main source of nonemployment income. Thus b_2 (or b_{12}) will not be a biased estimate of β_2 and preference differences of this type can be ignored.

Suppose now that P is a measure of preference differences of type 2, asset accumulation versus current consumption. In this case we obviously expect that $b_{32} > 0$. However β_3 (or $b_{13.2}$) would not be expected to have a non-zero value. Preference differences at this margin should not affect choices between leisure and the other two "goods." That is, a relatively high desired savings rate by itself should not

affect the amount of leisure taken so that the partial effect of preference differences should be zero. Preference differences of this type can, therefore, also be ignored without leading to bias in the income effect estimate.

Suppose finally that P is a measure of relative preferences of type 3, asset accumulation versus leisure. We expect first that $b_{32} > 0$ because relatively strong tastes for asset accumulation will in general result in relatively high assets and nonemployment income. And at this margin, strong tastes for asset accumulation will be accompanied by more hours of work and less time taken in leisure. Thus we also expect $\beta_3 > 0$, the partial effect of preferences on hours or work.

Neglecting relative preference differences of this type, therefore, leads to bias in the income effect estimate. Since

$$b_{12.3} = b_{12} - b_{13.2}\, b_{32}$$

there will be a positive bias in b_{12} as an estimate of the partial effect of income on hours of work, $b_{12.3}$, since we expect that $b_{13.2}$, $b_{32} > 0$. Estimates of the income effect with a positive bias that results from failure to control for preferences at this margin lead to a negative bias in estimates of the substitution effect derived from such income effect estimates.

MEASUREMENT OF RELATIVE PREFERENCES BETWEEN ASSET ACCUMULATION AND LEISURE

Differences in relative preferences, of course, can be only imperfectly measured. Suppose the measure of P suffers simply from random measurement error. Then we expect that $\hat{b}_{13.2} < b_{13.2}$ and also perhaps $\hat{b}_{32} < b_{32}$ where the $\hat{b}$'s are coefficients estimated with the preference variable P containing random measurement error. With measurement error of this type, some of the positive bias in an income effect estimate would remain; the bias would be reduced to the degree that some control over preference differences was obtained.

The relative preference measure we have used in our empirical analysis of the effect of nonemployment income on hours of work is of the form:

$$Pij = \frac{Mij - \hat{Mij}}{\hat{Mij} + (E/d)}$$

where Mij is the actual value of asset holdings, $\hat{Mij}$ is estimated asset holdings for a person with a given wage rate and age, E is full time earnings, and d is a discount factor to obtain the present value of human wealth. This measure reflects, in addition to differences in relative preferences for asset accumulation, differences among individuals in desired saving rates and other factors such as inheritance and fortuitous investment choices.

To analyze how the interrelationship between this measure of preferences and relative preferences of types 2 and 3 influence estimation, consider the following model. Let ρ_{12}, ρ_{13}, and ρ_{23} be the correlations between hours of work, nonemployment income, and a measure of "true" relative preference differences between asset accumulation and leisure. σ_1 and σ_2 are the standard deviations of H and Y. Then the "true" partial effect of Y on H can be written

$$b_{12.3} = \frac{\rho_{12} - \rho_{13}\rho_{23}}{(1 - \rho_{23}^2)^{1/2}} \cdot \frac{\sigma_1}{\sigma_2} .$$

It is virtually certain that our measure of relative preferences confounds preferences for assets versus leisure with the desired saving rate, and the variable P reflects differences in preferences of both types. How this affects estimates of the income effect can be clarified by analyzing how it affects the correlations involved. Persons with relatively high assets may have strong preferences for asset accumulation versus leisure or consumption or both. Thus our measure of relative preferences will result in $r_{23} > \rho_{23}$ where r_{23} is the correlation between our measure of P and Y. This will be so because positive correlation between P and Y will arise both from the desired saving effect and the "true" relative preference for asset accumulation versus leisure effect. ρ_{12}, σ_1, and σ_2 will be estimated correctly, of course, even with confounding in the preference variable. The influence on the estimate of the income effect thus depends on the relation between r_{13} and ρ_{13}.

Suppose our measure of P results in $r_{23} = \rho_{23}\, e^{\gamma}$, where γ represents the percent by which the correlation between Y and our measure of P exceeds the correlation between Y and a "true" measure of relative preferences for asset accumulation versus leisure. Then the estimated income coefficient can be written

$$\hat{b}_{12.3} = \frac{\rho_{12} - r_{13}\,\rho_{23}\, e^{\gamma}}{(1 - \rho_{23}^{2}\, e^{2\gamma})^{1/2}} \cdot \frac{\sigma_1}{\sigma_2} .$$

If $b_{12.3} = b_{12.3}$, there must be a compensating change in r_{13} as compared with ρ_{13} to offset the relation $r_{23} = \rho_{23}\, e^{\gamma}$. For no bias in the income effect estimate we must have

$$r_{13} = \frac{\rho_{13}}{e^{\gamma}} \left[\frac{(1 - \rho_{23}^{2}\, e^{2\gamma})}{(1 - \rho_{23}^{2})} \right] + \frac{\rho_{12}}{\rho_{32} e^{\gamma}} \left[1 - \frac{(1 - \rho_{23}^{2}\, e^{2\gamma})}{(1 - \rho_{23}^{2})} \right] .$$

As a first approximation what is required is that r_{13} must be lower than ρ_{13} by γ percent (that is, $r_{13} \simeq \rho_{13}/e^{\gamma}$), the same percentage that r_{23} exceeds ρ_{23}. We can expect that $r_{13} < \rho_{13}$, because in addition to the relation between preference differences and hours of work (positive), r_{13} reflects an income effect that is picked up through differences in savings rates (negative). It is important to note that r_{13} is not a partial correlation, and that r_{13} will differ from ρ_{13} through only the income effect so that r_{13} must be less than ρ_{13}. That it should differ by approximately the same percentage (in the opposite direction) as r_{23} exceeds ρ_{23} seems plausible. We have, however, not been able to demonstrate that it must differ by precisely the factor shown above, although it may be possible to show that this is the case.

In summary, this analysis has shown that differences in relative preferences, except at the asset accumulation-leisure margin, can be ignored without obtaining a biased estimate of the income effect. Ignoring relative preferences at the asset accumulation-leisure margin, on the other hand, leads to a positive bias in income effect estimates. The measure of relative preferences we use confounds relative preference differences at two margins, but it has been shown that this confounding will not necessarily result in a biased income effect estimate and that it is reasonable to expect that little or no bias will result.