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**Working Paper**

## Wage Growth, Family Labor Supply and the Distribution of Potential Family Earnings

Center Discussion Paper, No. 395

**Provided in Cooperation with:**

Yale University, Economic Growth Center (EGC)

*Suggested Citation:* Blau, David M. (1982) : Wage Growth, Family Labor Supply and the Distribution of Potential Family Earnings, Center Discussion Paper, No. 395, Yale University, Economic Growth Center, New Haven, CT

This Version is available at:

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CENTER DISCUSSION PAPER NO. 395

WAGE GROWTH, FAMILY LABOR SUPPLY AND THE  
DISTRIBUTION OF POTENTIAL FAMILY EARNINGS

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February 1982

Notes: Support from NIH Training Grant 5-T32-HD07146-04 and The William and Flora Hewlett Foundation is gratefully acknowledged. Useful comments by T. Paul Schultz are appreciated.

Center Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Discussion Papers should be cleared with the author to protect the tentative character of these papers.

## I. Introduction

A number of recent studies have investigated the implications of increases in labor force participation rates of married women for the distribution of earnings across families.<sup>1</sup> These studies typically compare a summary inequality measure of the actual distribution of husband's plus wife's earnings in some population of married-spouse-present households to a similar summary measure of husband's earnings alone in the same population. Virtually every study finds the sum of spouse's earnings more equally distributed than the husband's earnings alone.<sup>2</sup> This result has some intuitive appeal if one views the husband as the "primary" earner of the family with his earnings viewed as exogenous with respect to the wife's behavior and presumably exerting a negative income effect on her labor supply. Then husband's earnings and wife's labor supply would be negatively correlated and as long as the covariance of husband's earnings and wife's wage rate is not too strongly positive one would expect an equalizing effect of wife's earnings. That is, husbands with relatively high earnings would have wives with relatively low earnings and vice versa.

The interaction between the labor supply decisions of married women and the distribution of family earnings is a topic of considerable interest and policy-relevance but there are several problems with the literature as summarized above:

(1) The assumption that the wife responds to her husband's characteristics, e.g. earnings, in making labor supply decisions but that the husband does not respond to his wife's characteristics is an implicit untested

assumption in these studies. The theory of family labor supply together with the existing empirical evidence suggests that joint decision making, with both spouses' labor supply responding to prices and other exogenous parameters facing the family may be a more plausible hypothesis.<sup>3</sup>

(2) These studies in essence pose the question: what would happen to the distribution of family earnings if all working married women stopped working and their husbands did not respond in any way to this drastic change? This does not seem to be a very interesting counterfactual both because the assumed lack of a response by husbands is implausible and because of the drastic all-or-nothing nature of the hypothetical experiment.

(3) Even if the question were formulated more carefully it is not clear that the results of these studies can be meaningfully interpreted. Labor-leisure decisions are endogenous and are directly influenced by family preferences. Hence the distribution of actual family earnings is not necessarily a good proxy for the distribution of economic welfare given that earnings is a choice variable to a large extent. A step in the right direction in this regard would be to examine the distribution of potential family earnings, i.e. the sum of spouse's wage rates.

(4) Finally, almost all of the studies of this topic use cross-sectional data and treat wage rates as exogenous. A more appropriate approach to studying the effects of married women's labor supply decisions on the distribution of economic welfare would be to follow a cohort through time and allow for feedback of labor supply decisions on wage rates. This is particularly important because the on-the-job training hypothesis suggests that household decisions make wage rates as well as labor supply endogenous.

This paper studies the interactions between married women's labor supply decisions and the distribution of family earnings in a context in which the above shortcomings of the literature can be corrected. A two period model of family labor supply with endogenous wage growth is analyzed in order to derive predictions concerning the evolution of the distribution of spouses' wage rates over time. By making some simplifying assumptions it is possible to obtain unambiguous predictions of the signs of cross-spouse wage effects, compensated and uncompensated. However, unless the links between wage rates across periods are relatively weak, the signs of own-wage effects are ambiguous. These results are then used to derive predictions about changes in intracohort inequality over time. The main prediction is increasing equality over time in the distribution of the sum of the spouses wage rates. The model is estimated with a sample of young white, married-spouse-present women from the National Longitudinal Survey of Young Women, a panel data set with wage and labor supply data for women and their husbands. The majority of estimated parameters of the model are plausible and consistent with the theory. These estimates include negative uncompensated cross-spouse wage effects on labor supply, and for women a positive effect of labor market experience on the rate of wage growth. The predictions of the inequality analysis are confirmed in the data.

Section II of the paper presents and analyzes the theoretical model and discusses econometric methods for estimating the model. The data are described in Section III and the empirical results presented and discussed. Section IV presents the inequality analysis and Section V summarizes the

study. Appendix A contains details of the comparative statics and Appendix B describes the method used to impute wage rates.

## II. Theoretical Analysis

This section presents a two period model of the intertemporal labor-leisure choices of a husband-wife family with perfect foresight in the context of endogenous post-schooling human capital accumulation through on-the-job training at work.<sup>4</sup> The analysis focuses on two key issues: (1) the characterization of the pattern of own and cross-spouse wage effects on labor supply, both within and across periods; and (2) the implications of the model for empirical estimation of both labor supply functions and human capital accumulation functions. Section IV considers the implications of the model for the evolution of the distribution of potential family earnings over time.

Suppose that family utility in each period  $i$  is a function of the leisure time of the female ( $L_F$ ), the leisure time of the male ( $L_M$ ), and a composite purchased good ( $X$ ):

$$U^i = U(L_{Fi}, L_{Mi}, X_i) \quad i = 1, 2 \quad (1)$$

To allow for the household's anticipated continuation beyond period 2 it is assumed that the household receives utility from the stock of non-human assets it carries forward to the beginning of period 3. Hence  $h = h(A_3)$  represents the utility of carrying forward assets of amount  $A_3$  to future periods.<sup>5</sup>

The household's intertemporal budget constraint can be written as (discounting to period 1 and assuming perfect capital markets):

$$A_3 R^2 = (W_{M2} H_{M2} + W_{F2} H_{F2} - P_2 X_2) R + (W_{M1} H_{M1} + W_{F1} H_{F1} - P_1 X_1) + A_1 \quad (2)$$

where  $R = \frac{1}{1+r}$  and  $r$  is the interest rate,  $H_{ij}$  = hours worked by the  $i$ th spouse ( $i = M, F$ ) in the  $j$ th period,  $W_{ij}$  = the market wage rate of the  $i$ th spouse in the  $j$ th period,  $P_i$  = price of goods in period  $i$ , and  $A_1$  = initial assets. Non-earned sources of income are ignored. The adding up constraints on family time allocation are

$$\begin{aligned} L_{Mj} + H_{Mj} &= T \quad j = 1, 2. \\ L_{Fj} + H_{Fj} &= T \quad j = 1, 2 \end{aligned} \quad (3)$$

So far the model is a two-period version of the standard static family labor supply model (e.g. Ashenfelter and Heckman 1974). Since the focus of this paper is on changes in the potential family earnings distribution over time we must specify the process governing wage growth. The human capital model suggests as an accounting framework that the market wage rate offered to an individual equals the market rental rate per unit of human capital multiplied by the individual's stock of human capital. Suppose that by the beginning of period one both spouses have finished formal schooling and bring to the market exogenously determined stocks of human capital. For each spouse, the change in the human capital stock during period one depends upon the rate of depreciation of previously acquired human capital and the amount accumulated through on-the-job training during the period.

The amount accumulated through on-the-job training depends in turn on the amount of time spent in market work during period 1 and on the ability of the individual to learn from on-the-job experience. This suggests the following specification of wage growth for a representative couple:

$$W_{M2} = W_{M1}(1 - \delta) + f(\gamma_M, H_{M1}, W_{M1}) + Z \quad (4)$$

$$W_{F2} = W_{F1}(1 - \delta) + g(\gamma_F, H_{F1}, W_{F1}) + Z \quad (5)$$

where  $\delta$  is a common depreciation factor;  $\gamma_M$  and  $\gamma_F$  are individual-specific ability measures for learning on the job;  $f$  and  $g$  are human capital production functions with positive and decreasing marginal products; and  $Z$  is a common vector of exogenous factors affecting the rental rate per unit of human capital.<sup>6</sup>

The human capital production functions specified in (4) and (5) allow for the possibility that human capital may be a productive input to its own production by including  $W_{M1}$  and  $W_{F1}$  as inputs in  $f$  and  $g$ .

The household is assumed to maximize the present discounted value of utility,  $U(L_{F1}, L_{M1}, X_1) + S \cdot U(L_{F2}, L_{M2}, X_2) + S^2 h(A_3)$  where  $S = \frac{1}{1+\rho}$  and  $\rho$  is the rate of time preference, subject to the budget constraint (2), the time constraints (3), and the human capital production functions (4 and 5). Substituting (3), (4), and (5) into (2), the optimization problem can be expressed in Lagrangean form as



$$\begin{aligned}
\text{Max } \mathcal{L} &= U(L_{F1}, L_{M1}, X_1) + S \cdot U(L_{F2}, L_{M2}, X_2) + S^2 \cdot h(A_3) \\
&\quad - \lambda [A_3 R^2 - ((W_{M1}(1-\delta) + f(\gamma_M, H_{M1}, W_{M1}) + Z) [T - L_{M2}] \\
&\quad + [W_{F1}(1-\delta) + g(\gamma_F, H_{F1}, W_{F1}) + Z] [T - L_{F2}] - P_2 X_2) R \\
&\quad - W_{M1} [T - L_{M1}] - W_{F1} [T - L_{F1}] + P_1 X_1 - A_1] \quad (6)
\end{aligned}$$

where  $\lambda$  is the lagrangean multiplier. The necessary conditions for an interior maximum of (6) are the following:

$$\frac{\partial \mathcal{L}}{\partial L_{M1}} = U_{L_{M1}} - \lambda (H_{M2} f_2 R + W_{M1}) = 0 \quad (7)$$

$$\frac{\partial \mathcal{L}}{\partial L_{F1}} = U_{L_{F1}} - \lambda (H_{F2} g_2 R + W_{F1}) = 0 \quad (8)$$

$$\frac{\partial \mathcal{L}}{\partial L_{M2}} = S \cdot U_{L_{M2}} - \lambda W_{M2} R = 0 \quad (9)$$

$$\frac{\partial \mathcal{L}}{\partial L_{F2}} = S U_{L_{F2}} - \lambda W_{F2} R = 0 \quad (10)$$

$$\frac{\partial \mathcal{L}}{\partial X_1} = U_{X_1} - \lambda P_1 = 0 \quad (11)$$

$$\frac{\partial \mathcal{L}}{\partial X_2} = S U_{X_2} - \lambda P_2 R = 0 \quad (12)$$

$$\frac{\partial \mathcal{L}}{\partial A_3} = S^2 h' - \lambda R^2 = 0 \quad (13)$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = A_3 R^2 - (W_{M2} H_{M2} + W_{F2} H_{F2} - P_2 X_2) R$$

$$- (W_{M1} H_{M1} + W_{F1} H_{F1} - P_1 X_1) - A_1 = 0 \quad (14)$$

where  $f_2 = \partial f / \partial H_{M1}$  and  $g_2 = \partial g / \partial H_{F1}$ .

Equations (7) and (8) imply that  $L_{M1}$  and  $L_{F1}$  are chosen so that the marginal utility of leisure (in dollars, i.e. divided by  $\lambda$ ) equals the wage foregone in period 1 plus the discounted earnings foregone in period 2 by sacrificing the human capital that would have been accumulated had the last unit of leisure been allocated to work instead. These discounted foregone earnings in period 2 are represented by the terms  $H_{M2} f_2 R > 0$  and  $H_{F2} g_2 R > 0$  in (7) and (8) respectively. Hence the optimal values for  $L_{M1}$  and  $L_{F1}$  are lower than they would be in a model that omitted the human capital production functions. The interpretation of the other first order conditions is straightforward and standard.

In order to derive testable hypotheses from the model it is necessary to impose further structure on it. We have chosen to impose strong contemporaneous separability on the utility function, in addition to the intertemporal separability already assumed, implying that all cross-partial derivatives of the utility function are zero. Under this assumption, and setting  $P_1 = 1$  with  $X_1$  as numeraire, the comparative statics of the model are derived in Appendix A. The analysis is focused on the utility-compensated effects of changes in  $W_{M1}$  and  $W_{F1}$  on leisure in both periods of both spouses. Defining  $D$  as the

determinant of the bordered Hessian matrix and  $D_{ij}$  as the minor of the  $ij$ th element of the matrix, the second order conditions for a maximum require  $D < 0$  and  $D_{ii} > 0$ ,  $i = 1, \dots, 8$  (see Appendix A). From the results in Appendix A the following comparative static derivatives can be presented:

$$\frac{dL_{M1}}{dW_{M1}} \Big|_{\bar{u}} = \lambda \frac{1}{D} [(1 + RH_{M2} f_{23}) D_{11}^+ + R(1 - \delta + f_3) D_{31}^+]$$

$$\frac{dL_{M1}}{dW_{F1}} \Big|_{\bar{u}} = - \lambda \frac{1}{D} [(1 + RH_{F2} g_{23}) D_{21}^+ + R(1 - \delta + g_3) D_{41}^+] > 0$$

$$\frac{dL_{F1}}{dW_{M1}} \Big|_{\bar{u}} = - \lambda \frac{1}{D} [(1 + RH_{M2} f_{23}) D_{21}^+ + R(1 - \delta + f_3) D_{32}^+] > 0$$

$$\frac{dL_{F1}}{dW_{F1}} \Big|_{\bar{u}} = \lambda \frac{1}{D} [(1 + RH_{F2} g_{23}) D_{22}^+ + R(1 - \delta + g_3) D_{42}^+]$$

$$\frac{dL_{M2}}{dW_{M1}} \Big|_{\bar{u}} = \lambda \frac{1}{D} [(1 + RH_{M2} f_{23}) D_{31}^+ + R(1 - \delta + f_3) D_{33}^+]$$

$$\frac{dL_{M2}}{dW_{F1}} \Big|_{\bar{u}} = - \lambda \frac{1}{D} [(1 + RH_{F2} g_{23}) D_{32}^+ + R(1 - \delta + g_3) D_{43}^+] > 0$$

$$\frac{dL_{F2}}{dW_{M1}} \Big|_{\bar{u}} = - \lambda \frac{1}{D} [(1 + RH_{M2} f_{23}) D_{41}^+ + R(1 - \delta + f_3) D_{43}^+] > 0$$

$$\frac{dL_{F2}}{dW_{F1}} \Big|_{\bar{u}} = \lambda \frac{1}{D} [(1 + RH_{F2} g_{23}) D_{42}^+ + R(1 - \delta + g_3) D_{44}^+]$$

Each minor that can be signed either a priori from the second order conditions or by examination (see Appendix A) has its sign indicated above as do the derivatives themselves when they can be unambiguously signed. Several interesting patterns appear. Each of these utility-compensated wage effects has two terms. One is the pure substitution effect from a classical model in which period 2 wages are exogenous, and the other is a cross-period effect arising from the fact that a change in the period one wage causes the period two wage to change also. Consider  $dL_{M1}/dW_{M1}|_{\bar{u}}$  as an example. The first term  $\lambda(1 + R_{M2}^H f_{23}) D_{11}/D$  is the own-period substitution effect, which is negative as usual. The second term,  $\lambda R(1 - \delta + f_3) D_{13}/D$  should be equal to  $\partial L_{M1}/\partial W_{M2}|_{\bar{u}} \cdot \partial W_{M2}/\partial W_{M1}$ . That is, it is the effect of a change in  $W_{M2}$  on  $L_{M1}$  (regardless of the source of the variation in  $W_{M2}$ ) multiplied by the size of the change in  $W_{M2}$  caused by the original increase in  $W_{M1}$ . Both of these terms could be expected to be positive, although this cannot be shown unambiguously, so the complete effect of a compensated increase in  $W_{M1}$  on  $L_{M1}$  is ambiguous. Intuitively, a rise in  $W_{M1}$  makes leisure in period one more expensive so less is "bought". But a rise in  $W_{M1}$  causes  $W_{M2}$  to rise and this makes leisure in period 1 cheaper relative to leisure in period 2, so more is "bought" on this account. The net effect is uncertain, but the smaller the on-the-job training effect, the more likely it is that the net effect will be negative, as in the classical model.

It is interesting to note that this ambiguity arises only for the own wage effects, both within and across periods, but not for the cross-spouse wage effects, which are all unambiguously positive. In a model with additively separable preferences the compensated cross-spouse substitution effects are all positive, both within and across periods. In each of the 4 cross-spouse de-

derivatives one of the terms represents a within period cross-spouse effect and the other a cross-period cross-spouse effect, and both terms are positive, leading to unambiguous predictions in each case.

For purposes of estimation the analysis suggests that the labor supply of each spouse in each period is a function of both spouses' initial wage rates, initial assets, the vector  $Z$  of exogenous determinants of the period two market rental rate on human capital, and both spouses ability factors,  $\gamma_M$  and  $\gamma_F$ :

$$H_{ij} = H_{ij}(W_{M1}, W_{F1}, A_1, Z, \gamma_M, \gamma_F) \quad i = M, F; \quad j = 1, 2 \quad (15)$$

The following signs of the partial derivatives of equations (15) are predicted by the above analysis:  $\partial H_{Mj} / \partial W_{F1} | \bar{u} < 0$  and  $\partial H_{Fj} / \partial W_{M1} | \bar{u} < 0$ ,  $j = 1, 2$ . Other predictions of the analysis are presented in Appendix A.

The complete model to be estimated consists of the four labor supply equations (15) and the two wage growth equations (4 and 5). In the next section the empirical specification of the model is discussed. The remainder of this section deals with the stochastic specification and its implications for estimation of the model.

Let us transform (4) and (5) into percentage wage growth equations and include random disturbances with zero mean and constant variance:

$$G_M = G_M(\gamma_M, H_{M1}, W_{M1}, Z, \epsilon_M) \quad (4')$$

$$G_F = G_F(\gamma_F, H_{F1}, W_{F1}, Z, \epsilon_F) \quad (5')$$

where  $G_M$  and  $G_F$  are wage growth rates, and  $\epsilon_M$  and  $\epsilon_F$  are the disturbances. The latter represent omitted factors that perhaps belong in  $Z$  or  $\gamma_m$  and  $\gamma_f$  and are unobserved but known to the individual. Given that the individuals are aware of the realized values of  $\epsilon_M$  and  $\epsilon_F$  when making their labor supply decisions these decisions will depend on  $\epsilon_M$  and  $\epsilon_F$ . This implies that  $H_{M1}$  and  $H_{F1}$  are correlated with  $\epsilon_M$  and  $\epsilon_F$ , so Ordinary Least Square (OLS) estimates of the parameters of (4') and (5') would be biased. However, OLS can provide consistent estimates of (15) and the results used as first stage estimators for  $H_{M1}$  and  $H_{F1}$  in Two Stage Least Squares (2SLS) estimation of (4') and (5').<sup>7</sup> If  $\epsilon_M$  and  $\epsilon_F$  were correlated then the asymptotic efficiency of 2SLS estimates could be improved upon by joint estimation of (4'), (5') and (15) with Three Stage Least Squares (3SLS).

### III. Empirical Analysis

The empirical work was carried out with data from the National Longitudinal Survey (NLS) of Young Women<sup>8</sup> using the panel observations from 1968 through 1975. Using this data we have constructed Periods One and Two wage rates as follows. Period One is defined as 1968-71 and the Period One wage for an individual is the average of all the full-time wages observed between 1968 and 1971, after deflating them all to a 1967 base. The maximum number of wage observations that could go into constructing what we call for short "wage one" for each individual is four, the minimum is one and the average is 2.7.

The main reason for taking a period as long as this and constructing an average wage over the period is to get as accurate as possible a measure of the wage, free of transitory influences that could affect any single wage observation. Period Two is then defined as 1973-1975 and "wage two" is constructed in an analogous manner with a maximum of two possible observation points.<sup>9</sup>

For women, wage rates were observed directly, but men's wage rates had to be calculated by dividing annual earnings by annual hours, thus introducing a potential source of measurement error. In order to have an observed wage rate an individual must have worked at least part of the period. Hence using actual wage rates in the analysis would force the exclusion of non-workers, thus truncating the observed range of work behavior. To avoid truncating the sample in this manner it is desirable to estimate wages for non-workers. Thus we have created predicted market wage measures for both spouses in both periods using wage regression estimates on the samples reporting wages in each period. The wage regressions include a variable constructed to correct for the potential selectivity bias that arises when using a non-random sample such as workers. The technique used to correct for selectivity bias is due to Olsen (1980) and the results are reported in Appendix B. Using the results from Table B-2, wage one measures have been constructed for each spouse corresponding to mid 1969 and wage two measures for the beginning of 1974.<sup>10</sup> From these measures we then construct a predicted annual average percentage wage growth rate for each spouse from mid 1969 to the beginning of 1974. Table 1 presents sample means and standard deviations for these and other variables used in the analysis. The table shows that men had higher wages than women in both periods but that women's wages grew slightly more rapidly, so that as a percentage of the average man's wage the average

woman's wage rose from 63.8% to 64.9%.

Work experience measures were constructed by adding up weeks worked during each period and dividing by the total number of weeks in the period, yielding the percent of period worked measures shown in Table 1. These measures correspond to the  $H_{ij}$  in the theoretical model except for being measured in percentage terms rather than as absolutes. The reason for this change is that some individuals in the sample were still in school for part of period one and are therefore considered not "eligible" for labor force participation for that part of the period, given that schooling decisions are taken as predetermined here. Also, some of the couples did not marry until after the beginning of period one and there is no information available for men until they marry a woman in the sample. Table 1 shows that most of the men worked full time in both periods while the participation rate was not only much lower for women but fell by almost 10 percentage points from period one to two. The average woman in the sample was 22 years old in mid 1969 and about 27 years old at the beginning of 1974 so the decline in the labor force participation rate is coincident with the onset of the prime child-bearing years.

The other variables shown in Table 1 include education levels for each spouse, dummy variables for southern residence and residence in an SMSA, and the local unemployment rate. Education and age (year born) are intended to represent the ability factors  $\gamma_M$  and  $\gamma_F$ , which cannot be directly observed. These sorts of proxies for unobservables have been used in previous human capital production function estimation (Lazear 1976 and Heckman 1975).



The family characteristics represent elements of the vector  $Z$ , variables that exogenously affect the rental rate of human capital.

Another variable that belongs in the analysis according to the theory is  $A_1$ , the initial assets of the family. Including  $A_1$  in the labor supply equations would permit estimation of wealth effects and calculation of compensated wage effects. However, the asset data available in the NLS are not considered to be of higher quality than most other asset data collected directly from respondents and therefore probably include large errors. Furthermore, serious questions have been raised regarding the possibility of spurious correlation arising between assets and labor supply due to the possible dependence of both on tastes.<sup>11</sup> Thus although in the theoretical model  $A_1$  is exogenous, in practice it would be very difficult to construct an exogenous asset measure from the available data. Thus we choose to omit assets although this will rule out the computation of compensated wage effects.<sup>12</sup>

The samples available for estimating the model consist of 909 white married couples for whom wages could be estimated for both periods and both spouses and with complete information available on all other variables. Of the 3,663 white women aged 14-24 in 1968 included in the survey originally, the majority of the exclusions here were due to not being married and attrition from the panel.<sup>13</sup>

Table 2 presents OLS and 2SLS estimates of the parameters of the wage growth equations for wives and husbands. The coefficient estimate for wives on "Percent of Period One Worked" is positive and significant in both cases with a substantially larger point estimate generated by 2SLS than OLS. The larger estimate in the 2SLS case suggests that the correlation between the

disturbance in the wage growth equation and the experience variable causes a downward bias in conventional OLS estimates of the effect of experience on wage growth. For husbands the results show a negative effect of experience on wage growth, significant in the 2SLS case. This unexpected result suggests that the wage growth rate of young white married men is negatively affected, other things constant, by work experience and presumably on-the-job training, but it is difficult to imagine the sort of behavior that could lead to this result. Thus, in the case of husbands the experience variable may not be highly enough correlated with the amount of training received on the job to serve as a good proxy for it.

The results in Table 2 also indicate large negative and significant coefficient estimates on the period one wage, suggesting that the initial human capital stock as represented by the wage has a negative effect on the rate of production of further human capital. In fact the coefficient estimates are implausibly large, with implied elasticities at the means of about -10 for wives and -4 for husbands. This type of result has been encountered in other studies and suggests a spurious association between the rate of wage growth and the initial wage. The two are definitionally related, of course, but this by itself is unlikely to account for such large negative coefficients. Heckman (1975) suggests that some variable omitted from the wage growth equation may be correlated with both the initial wage and the rate of wage growth and its omission would thus lead to biased estimates of the initial wage coefficient.<sup>14</sup>

Education is included in the wage growth equations as a proxy for learning ability on the job, and its coefficient estimates are positive and

significant. Even if education was uncorrelated with learning ability on the job, human capital theory would still predict a positive education coefficient,<sup>15</sup> so it is reassuring to see it appear here. The implied education elasticities at the means are a relatively large 7.7 for women and 1.6 for men.

The rate of wage growth rises fairly rapidly with age for wives and rises with age but at a slower pace for husbands. Human capital theory predicts an eventually declining rate of wage growth with age, but this is consistent with an initially rising segment. Given average ages of 22 and 25 years for wives and husbands in 1969, a rising rate of wage growth with age is plausible.

Residence in the South depresses wage growth and residence in an SMSA raises it. The unemployment rate has a perverse positive and significant, though small, effect on wives' wage growth and insignificant effects for husbands.

It is interesting to note that almost no coefficient estimates change much between OLS and 2SLS with the exception of the coefficients on the experience variable, already noted above.<sup>16</sup> This suggests that previous OLS estimates of wage growth equations containing an experience variable are not seriously biased except for the experience coefficient itself. Lazear's (1976) estimate of a positive significant effect of experience on wage growth for young men from the NLS Young Men Survey may therefore be questionable in light of our results.

Table 3 presents OLS estimates of the equations explaining the percent of each period worked.<sup>17</sup> The own wage effects are not significantly differently from zero except for the husband's in period two while the cross-spouse wage effects are all negative and significant. This pattern makes sense in view of the theory, which predicted negative compensated cross effects and, if the experience effect on wage growth is relatively small, positive own wage effects. The estimates reported in Table 3 are, however, uncompensated effects; if income effects on labor supply are negative, then the negative cross wage effects would be reinforced and the positive own wage effects would be offset. Thus the insignificant own wage estimates could represent offsetting income and substitution effects and the negative significant cross wage estimates represent the sum of negative income and substitution effects.

The uncompensated cross-spouse wage elasticities of labor supply are larger for the wife than for the husband, which is consistent with the notion that married women's labor supply is relatively elastic compared to married men.<sup>18</sup> However, all of the cross-spouse wage elasticities are larger than one in absolute value, contradicting the view that married men respond very inelastically to relative prices in making labor supply decisions. Notice also that the elasticities decline over time but there is still a relatively large labor supply response in period two to the period one spouse's wage. The only significant own wage elasticity, for the husband in period two, is a relatively small .50. This figure contains the income effect as well as the substitution effect, however, so the compensated own-wage elasticity is no doubt larger.

The cross-spouse education effects on labor supply are all positive and significant with elasticities close to or greater than one. Of the own education effects only the wife's in period one is positive and significant, while the husband's in period two is actually negative and significant. These results make our interpretation of education as a proxy for learning ability on the job questionable for the following reason. The model predicts negative compensated cross-spouse ability effects on labor supply as long as the effect of ability on the marginal product of experience in the wage growth equation is positive (see Appendix A) and positive compensated own ability effects on labor supply if the effect of experience on wage growth is small as well. The results presented in Table 3 are uncompensated effects and increases in ability have income effects on labor supply as well, presumably negative if leisure is a normal good. Hence the uncompensated cross-spouse education effects should consist of the sum of negative income and substitution effects, yet empirically they are all positive and significant. The uncompensated own education effects should consist of offsetting negative income and positive substitution effects, yet only two are insignificant and of the two statistically significant effects one is positive and the other negative. This suggests that some factor not explicitly considered in the model, such as assortative mating by education and correlation between education and tastes for work, may be behind these results.

In this model year born (or age) of the wife and husband were also intended to represent learning ability with the hypothesis being that given the relative youth of the sample learning ability may increase with age possibly at a declining rate. Under this interpretation one would expect negative uncompensated cross-spouse age effects on labor supply and uncertain

own age effects due again to offsetting income and substitution effects. The empirical results are, however, similar to those for education with the quadratic cross-spouse age effects all positive when evaluated at the means and the own effects predominately negative. These results suggest that age is playing a role other than that hypothesized here, possibly again involving assortative mating and tastes for work.

The remaining coefficient estimates in Table 3 indicate that residence in the South reduces labor supply and residence in an SMSA raises labor supply of both spouses, with statistically significant estimates only for the first period. Increases in the local unemployment rate depress labor supply of married women but the estimates for men are small and insignificant. In terms of the theoretical model these results suggest a relatively higher rental rate on human capital in SMSAs and areas with low unemployment and a relatively low rental rate in the South.

#### IV. Inequality Analysis

The empirical results presented above have some interesting implications for the evolution of the distribution of potential family earnings of a given cohort over time. To develop these implications note that the variance of the sum of the spouses wage rates in period  $i$  can be written as

$$\text{Var} (W_{Mi} + W_{Fi}) = \text{Var} (W_{Mi}) + \text{Var} (W_{Fi}) + 2 \text{Cov} (W_{Mi}, W_{Fi}).$$

Dividing both sides by  $(\bar{W}_{Mi} + \bar{W}_{Fi})^2$  and multiplying the first term on the RHS by  $\bar{W}_{Mi}^2 / \bar{W}_{Mi}^2$ , the second by  $\bar{W}_{Fi}^2 / \bar{W}_{Fi}^2$  and the third by  $\bar{W}_{Mi} \bar{W}_{Fi} / \bar{W}_{Mi} \bar{W}_{Fi}$

yields an expression for the square of the coefficient of variation of the sum of the spouses wage rates:

$$CV^2(W_{M1} + W_{F1}) = \alpha_1^2 CV^2(W_{M1}) + (1 - \alpha_1)^2 CV^2(W_{F1}) + 2 \rho_1 \alpha_1 (1 - \alpha_1) CV(W_{M1}) CV(W_{F1})$$

where  $\alpha_1 \equiv \bar{W}_{M1} / (\bar{W}_{M1} + \bar{W}_{F1})$  and  $\rho_1$  is the correlation coefficient of  $W_{M1}$  and  $W_{F1}$ .

Now, assuming that  $\alpha_1$  changes negligibly from periods one to two the difference in the squared coefficient of variation of the wage sum between periods two and one is

$$\begin{aligned} CV^2(W_{M2} + W_{F2}) - CV^2(W_{M1} + W_{F1}) &= \alpha^2 [CV^2(W_{M2}) - CV^2(W_{M1})] \\ &+ (1 - \alpha)^2 [CV^2(W_{F2}) - CV^2(W_{F1})] + 2\alpha(1 - \alpha) [\rho_2 CV(W_{M2}) CV(W_{F2}) \\ &- \rho_1 CV(W_{M1}) CV(W_{F1})]. \end{aligned}$$

Inspection of this expression reveals that if the separate distributions of the husband's and wife's wage rates become more equal over time (i.e. if the expressions in the first two brackets are negative) then as long as  $\rho_2$  and  $\rho_1$  are positive the distribution of the sum of the wage rates will move toward equality as well unless  $\rho_2 > \rho_1$  by a large enough amount.

The results in Table 2 suggest that increasing equality in the separate distributions is a likely consequence of the large negative impact of the initial wage on subsequent growth. This is also consistent with Mincer's (1974) analysis in which during the stage prior to "overtaking" the earnings of high investors in human capital catch up to the initially higher earnings of low investors. Since overtaking is calculated to occur 7-9 years after

leaving school, the majority of this sample fit into the pre-overtaking category. The empirical results are less clear on the likely direction of change of the correlation coefficient. A husband with a relatively high period one wage can expect slow growth in his own wage and, via the negative effect of his wage on his wife's labor supply and the resulting labor supply effect on her wage growth, slow growth in her wage. On the other hand a wife with a relatively high wage in period one will experience relatively slow wage growth but her husband is likely to have relatively faster wage growth since her wage has a negative effect on his labor supply, which in turn has a positive effect on his wage growth (that is,

$\frac{\partial G_M}{\partial L_M} \cdot \frac{\partial L_M}{\partial W_{F1}} > 0$  since both terms are negative). This would tend if anything to reduce the correlation between spouse's wage rates over time, a prediction of Smith's (1979) analysis as well.

Thus on balance the most likely direction of change in both the separate wage rate distributions and in the distribution of the sum is toward equality, with the correlation coefficient declining also. Table 4 presents data for the sample that confirm all of these predictions. The coefficients of variation for all three distributions fell from periods one to two with the relative decline for the sum (19%) bracketed by the declines for the husband's (14%) and the wife's (21%) wage rates. The very high correlation between the wage rates, caused at least in part by high correlations between spouses education levels (.53) and ages (.76), remained high in period two but did decline somewhat. As expected the distribution of husbands' labor supply in both periods is much more equal than that of wives, while the correlation between spouses' labor supply is close to zero.



## V. Summary

This paper has attempted to quantify the role of married women's labor supply behavior as a determinant of the distribution of potential family earnings. The framework of the study was designed to correct some of the shortcomings of previous work in this area. The theoretical framework proposed is a two period model of family labor supply with endogenous human capital growth. Analysis of the model leads to a number of comparative static predictions concerning the effects of an individual's initial wage rate and on-the-job learning ability on his or her labor supply and on the labor supply of his or her spouse. These predictions are tested by estimating the parameters of the model using repeated observations on a sample of young, white, married, spouse-present couples. The majority of the empirical results are consistent with the model's predictions, including negative uncompensated cross-spouse wage effects on labor supply both within and across periods, and positive age, education, and (for wives) experience coefficients in the wage growth equations. Some of the results that do not conform to expectations include a negative effect of husband's experience on the rate of wage growth, negative effects for both spouses of initial wage rates on the rate of wage growth, and generally positive cross-spouse age and education effects on labor supply.

Given these results, it was possible to derive predictions about changes over time in the degree of inequality in the distributions of husband's, wife's and the sum of spouse's wage rates. All three distributions were predicted to become more equal over time and these predictions are confirmed in the sample used for the study. These tendencies may in part be due to the particular age group used, namely quite young couples,

and a future study will test these predictions on other cohorts as well. The main implication of these findings is that married women's labor supply decisions clearly do have an effect on the potential family earnings distribution but assesment of the nature and magnitude of the effect must take into account the endogeneity of those decisions.

## Appendix A

Total differentiation of the first order conditions given in the text (equations 7-14) yields the following matrix differential equation:

$$\begin{bmatrix}
 a & 0 & b & 0 & 0 & 0 & 0 & c \\
 0 & d & 0 & e & 0 & 0 & 0 & i \\
 b & 0 & j & 0 & 0 & 0 & 0 & \rho \\
 0 & e & 0 & m & 0 & 0 & 0 & n \\
 0 & 0 & 0 & 0 & q & 0 & 0 & -1 \\
 0 & 0 & 0 & 0 & 0 & s & 0 & -RP_2 \\
 0 & 0 & 0 & 0 & 0 & 0 & S^2 h'' & -R^2 \\
 f & i & \rho & n & -1 & -RP_2 & -R^2 & 0
 \end{bmatrix}
 \begin{bmatrix}
 dL_{M1} \\
 dL_{F1} \\
 dL_{M2} \\
 dL_{F2} \\
 dX_1 \\
 dX_2 \\
 dA_3 \\
 d\lambda
 \end{bmatrix}
 =
 \begin{bmatrix}
 \lambda ([1+RH_{M2} f_{23}] dW_{M1} + RH_{M2} f_{12} dY_M) \\
 \gamma ([1+RH_{F2} g_{23}] dW_{F1} + RH_{F2} g_{12} dY_F) \\
 R\lambda ([1-\delta + f_3] dW_{M1} + dZ + f_1 dY_M) \\
 R\lambda ([1-\delta + g_3] dW_{F1} + dZ + g_1 dY_F) \\
 0 \\
 R\lambda dP_2 \\
 0 \\
 Y
 \end{bmatrix}$$

where

$$a = U_{L_{M1} L_{M1}} + R\lambda H_{M2} f_{22} < 0$$

$$b = R\lambda f_2 > 0$$

$$c = -RH_{M2} f_2 - W_{M1} < 0$$

$$d = U_{L_{F1} L_{F1}} + R\lambda H_{F2} g_{22} < 0$$

$$e = R\lambda g_2 > 0$$

$$i = -RH_{F2} g_2 - W_{F1} < 0$$

$$j = S U_{L_{M2} L_{M2}} < 0$$

$$l = -RW_{M2} < 0$$

$$m = SU_{L_{F2}L_{F2}} < 0$$

$$n = -RW_{F2} < 0$$

$$q = U_{X_1 X_1} < 0$$

$$s = SU_{X_2 X_2} < 0$$

$$Y = R(H_{M2} [(1-\delta)dW_{M1} + dZ + f_1 dy_m] + H_{F2} [(1-\delta)dW_{F1} + dZ + g_1 dy_F])$$

$$-X_2 dP_2 + dA_1 + H_{M1} dW_{M1} + H_{F1} dW_{F1}$$

Recall from the text that  $X_1$  is taken as the numeraire and  $P_1 = 1$ , and that all cross partial derivatives of the utility function are assumed to equal zero.

The second order conditions for a maximum require that the principal minors of the Hessian determinant, bordered by a row and column of first partial derivatives of the combined constraint, alternate in sign starting with plus. Thus this requires that

$$\begin{vmatrix} a & o & c \\ o & d & i \\ c & i & o \end{vmatrix} > 0, \quad \begin{vmatrix} a & o & b & c \\ o & d & o & i \\ b & o & j & l \\ c & i & l & o \end{vmatrix} < 0, \dots, D_{ii} > 0, D < 0,$$

where  $D_{ii}$  is the minor of the  $i$ th diagonal element of the matrix above, and  $D$  is the determinant of the matrix itself. Evaluation of these determinants reveals that sufficient conditions for a maximum amount to

nothing more than the following two requirements:  $dm > e^2$  and  $aj > b^2$ . Given the separability assumption it is not surprising that the first condition involves only terms relating to the husband and the second condition only terms relating to the wife. These two conditions simply require that the intertemporal time allocation problem of each spouse not have a corner solution, i.e. that in  $L_{F1} - L_{F2}$  ( $L_{M1} - L_{M2}$ ) space the nonlinear budget constraint is less convex than the indifference curves, holding prices, assets etc. fixed. The nonlinearity in the budget constraint arises from the human capital production functions. It will be assumed that  $dm > e^2$  and  $aj > b^2$ , implying  $D_{ii} > 0$ ,  $i = 1, \dots, 8$  and  $D < 0$ .

Even without making these assumptions it is easily ascertained that several other minors that will be of interest can be signed:

$$D_{21} = (bl - cj) qsS^2h''(mi - en) > 0$$

$$D_{41} = (bl - cj) qsS^2h''(dn - ei) > 0$$

$$D_{32} = (en - im) qsS^2h''(al - bc) > 0$$

$$D_{43} = (dn - ei) qsS^2h''(bc - al) > 0$$

Two other minors of interest that cannot be signed even making use of the above assumptions are:

$$D_{31} = b(q[sR^4 + P_2^2R^2S^2h''] + sS^2h'')(dm - e^2) + bqsS^2h''((im - en)i - (ie - dn)n) + qsS^2h''cl(dm - e^2).$$

$$D_{42} = e(q[sR^4 + P_2^2R^2S^2h''] + sS^2h'')(aj - b^2) + eqsS^2h''((al - bc)l + (jc - bl)c) + nqsS^2h''(aj - b^2).$$

In both cases the first two terms are positive and the third is negative.

Using these results and applying Cramers rule to solve for the comparative static derivatives, we find the compensated wage effects on leisure presented in the text. It is easy to see also by examining the right side of the matrix equation above that if  $f_{12}$  and  $g_{12}$  are positive then  $dL_{F1}/d\gamma_M|_{\bar{U}}$ ,  $dL_{F2}/d\gamma_M|_{\bar{U}}$ ,  $dL_{M1}/d\gamma_F|_{\bar{U}}$ , and  $dL_{M2}/d\gamma_F|_{\bar{U}}$  are all positive and the other compensated leisure effects of changes in  $\gamma_M$  and  $\gamma_F$  cannot be signed. Finally, none of the compensated leisure effects of changes in  $Z$  can be signed.

## Appendix B

The wage measures described in the text were regressed on a set of characteristics for each spouse in each period in order to impute wage rates to the whole sample, including workers and nonworkers. These regressions are corrected for possible selectivity bias arising from the use of a non-random sample (workers) by a method developed by Olsen (1980). This involves first estimating linear models of the probability of observing a wage for each spouse and period. These regressions are reported in Table B-1 with the explanatory variables including education, year born, various higher order powers and interactions, and for women a measure of the socioeconomic status of the household in which they were raised. A selectivity correction term is computed for each observation from each of these regressions as  $\hat{P}-1$ , where  $\hat{P}$  is the fitted value of the dependent variable. These terms are then entered in the wage regressions, which are reported in Table B-2 both with and without the selectivity correction term. Given the statistical significance of the selectivity correction term in three out of four cases at the 5% significance level, we use the regressions including it to impute wages.

Note that the samples used in Tables B-1 and B-2 include nonwhites and also include any observation for which data were available on the variables used in those regressions, regardless of whether the observation is part of the subsample used in the regressions reported in the text. This was done in order to use the maximum amount of information available in constructing wage rates.

## Footnotes

<sup>1</sup>See Danziger (1980), Lehrer and Nerlove (1980), Smith (1980) and Thurow (1976) for studies using U.S. data and Gronau (1981) for a study of Israeli data.

2

<sup>3</sup>Ashenfelter and Heckman (1974) and Kniesner (1976) report small, but positive statistically significant uncompensated effects of the wife's wage rate on the husband's labor supply among married U.S. couples. Rosenzweig (1980) reports marginally significant effects using Indian data.

<sup>4</sup>All of the issues of interest, particularly the distributional issues can be handled in a two period framework with no loss of generality, thus obviating the need for a less tractable full life cycle model. For examples of the latter see Blinder and Weiss (1976), Ghez and Becker (1975), Heckman (1975) and Smith (1977). All except Smith consider only one-person households.

<sup>5</sup>It might be considered reasonable in this context to allow the household to receive utility from the stocks of human as well as physical capital carried forward but this complicates the analysis considerably.

<sup>6</sup>Equations (4) and (5) are approximations derived from the fact that for individual  $i$ ,  $W_{i2} = \theta_2 K_{i2} = (\theta_1 + \Delta\theta)(K_{i1} + \Delta K_i) = \theta_1 K_{i1} + \theta_1 \Delta K_i + K_{i1} \Delta\theta + \Delta\theta \Delta K_i = W_{i1} + \theta_1 (f(.) - \delta K_{i1}) + K_{i1} Z = W_{i1} (1 - \delta) + \theta_1 f(.) + K_{i1} Z$ , where  $\theta_j$  = rental rate on human capital in period  $j$  ( $j = 1, 2$ ),  $K_{ij}$  = person  $i$ 's human capital stock in period  $j$ , and  $\Delta K_i \equiv f(.) - \delta K_{i1}$ ,  $\Delta\theta \equiv Z$ , and the term  $\Delta\theta \Delta K$  is ignored as a second order term. The equations



in the text are derived by normalizing  $\theta_1 = K_{11} = 1$ . In the empirical work the unobserved  $\theta_1$  and  $K_{11}$  will vary across individuals and their effects will be captured by the estimated coefficients on observable variables.

This specification of the wage growth process differs from that of, e.g., Ben-Porath (1970), Heckman (1975), and Blinder and Weiss (1976) who assume that  $H_{1j}$  is divided in a way chosen by the individual into mutually exclusive components of work time and learning time with only the latter contributing to human capital formation. It differs also from Rosen's (1977) formulation in which firms determine the learning potential of jobs and workers choose the job with the optimal combination of current and future earnings. Both of these specifications involve key unobservable variables, as does mine.

<sup>7</sup>This abstracts from other possible reasons why OLS could be biased, e.g. truncation of the dependent variables, discussed in Section III.

<sup>8</sup>The NLS data are described in Center for Human Resource Research (1976) and in a variety of other volumes published by the Center.

<sup>9</sup>No survey was taken in 1974. Also, no direct data on women's wage rates were collected in 1972, so this year is ignored as well.

<sup>10</sup>Wage rates were constructed at the same dates for the whole sample in order to eliminate the length of the period as a variable. The particular dates chosen correspond roughly to the average dates of observation of actual wages one and two. For example, the "date of observa-

tion" of wage one for an individual for whom wage one was constructed as the average of 1968, 1969, 1970, and 1971 wage observations would be mid 1969 (69.5).

<sup>11</sup>See Smith (1980) for a full discussion of this issue.

<sup>12</sup>Other researchers have chosen this strategy as well for similar reasons. See, e.g. Kniesner (1976). In some regressions not reported here that included assets the coefficient on assets was never significant at the 5% level and none of the other coefficients changed much.

<sup>13</sup>By 1975 attrition from the panel had reached 17.8% of the original observations. Attrition bias is ignored here. See Griliches, Hall and Hausman (1978) for a discussion of this issue.

<sup>14</sup>Heckman (1975, p. 254) suggests market inputs into postschool investment as a candidate for an omitted variable correlated with both the wage rate and the wage growth rate.

<sup>15</sup>Earnings profiles are predicted to be steeper for more highly educated individuals with a given amount of work experience because if the present value of their lifetime earnings is to be equated with those of less educated individuals then their earnings will have to grow faster in order to make up for starting later.

<sup>16</sup>The model was estimated with 3SLS as well, with the result that almost all coefficients in the wage growth equations were virtually unchanged from the 2SLS estimates. The exception was the coefficient on

Percent of Period One Worked for the husband, which almost doubled in absolute value and remained negative.

<sup>17</sup>Ordinarily there is a large concentration of observations of married women's labor supply at the lower bound of zero, causing a well-known bias in OLS coefficient estimates. In the present data set the youth of the sample and the 3-4 year period length results in only 12% of the women with zero percent of the first period worked, and 24% with zero percent of the second period worked. The labor supply equations for females were reestimated with Tobit to see if even this relatively small concentration of observations at zero mattered, but no substantial changes in coefficient estimates resulted.

<sup>18</sup>See Ashenfelter and Heckman (1974) for results of this type. Their results for all age groups combined indicate that husband's and wife's leisure times are complements while the present results for young couples suggest that they are substitutes.

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Table 1  
 Sample Characteristics<sup>a</sup>  
 (Means and Standard Deviations)

Individual Characteristics	Wives		Husbands	
Predicted Wage Growth <sup>b</sup> (Annual Average Percent)	4.70	(2.76)	4.21	(1.56)
Predicted First Period Wage <sup>c</sup> (\$/hour, real)	1.85	(.44)	2.90	(.63)
Predicted Second Period Wage <sup>c</sup> (\$/hour, real)	2.26	(.42)	3.48	(.65)
Percent of Period One Worked <sup>d</sup>	52.1	(37.8)	90.7	(18.7)
Percent of Period Two Worked <sup>d</sup>	42.7	(37.1)	92.8	(14.2)
Years of Education in Period One	11.5	(1.9)	12.2	(2.4)
Year Born (19--)	47.1	(3.2)	44.8	(4.5)
<u>Family Characteristics<sup>e</sup></u>				
Local Unemployment Rate	4.7		(1.6)	
Dummy = 1 if lives in South	.34		(.47)	
Dummy = 1 if lives in SMSA	.55		(.47)	
Sample size			909	

- Notes: <sup>a</sup>The sample consists of white married couples from the National Longitudinal Survey of Young Women with complete information on all variables used in the analysis.
- <sup>b</sup>Predicted Wage Growth is calculated as  $(\ln W_2 - \ln W_1)/4.5$ , where  $W_2$  and  $W_1$  are predicted second and first period wages, and 4.5 is the number of years over which growth is measured (mid 1969 to early 1974).
- <sup>c</sup>See Appendix B for details of the wage prediction procedure.

(Continued next page)

<sup>d</sup>The Percent of Period One Worked equals the total number of weeks of work from 1968 through 1971 divided by the number of weeks in the period (and multiplied by 100). Schooling periods are excluded from the period as are periods for men before they married a woman in the sample and began reporting information. The Percent of Period Two Worked is defined similarly for 1972-1975, except that no information was available for 1974 since there was no survey that year.

<sup>e</sup>The family characteristics all apply to period one and are averages from 1968-1971. For example if a couple lived in the South for two of the four years then the Southern variable equals .50.

Table 2

Ordinary and Two Stage Least Squares Wage Growth Results<sup>a</sup>

	<u>Wives</u>				<u>Husbands</u>			
	OLS		2SLS		OLS		2SLS	
Intercept	68	(9.6)	82	(6.6)	32	(37.0)	36	(18.4)
Percent of Period One Worked	.01	(8.1)	.07	(7.9)	-.001	(0.7)	-.06	(3.5)
	(.11)		(.78)		(-.02)		(-1.3)	
Period One Wage	-26	(14.0)	-25	(7.8)	-5.3	(30.8)	-5.2	(18.8)
	(-10.2)		(-9.8)		(-3.6)		(-3.6)	
Education	3.2	(14.3)	2.7	(7.0)	.53	(20.0)	.55	(12.8)
	(7.8)		(6.6)		(1.5)		(1.6)	
Year Born	-1.1	(8.6)	-1.4	(6.1)	-.42	(28.3)	-.42	(17.9)
	(-11.0)		(-14.0)		(-4.5)		(-4.5)	
D - South	-6.4	(13.4)	-6.4	(7.7)	-1.6	(15.9)	-1.5	(9.6)
D - SMSA	5.0	(12.5)	4.8	(6.8)	1.5	(13.7)	1.4	(8.0)
Unemployment Rate	.05	(1.7)	.18	(3.4)	.01	(0.4)	-.01	(0.4)
R <sup>2</sup> (F)	.76	(403)			.70	(296)		

Notes:

<sup>a</sup>The only endogenous explanatory variable is Percent of Period One Worked. The first stage regressions for this variable are given in Table 3.

T-statistics are in parentheses next to the coefficients and elasticities calculated at the means are in parentheses beneath the coefficients.



Table 3

## Linear Regression Results for Percent of Period Worked

	<u>Period One</u>				<u>Period Two</u>			
	Wives		Husbands		Wives		Husbands	
Intercept	1,104	(2.9)	824	(3.9)	-234	(0.6)	576	(3.6)
Wife's Period One Wage	-53	(1.1)	-91	(3.4)	-10.5	(0.2)	-55	(2.7)
	(-1.9)		(-1.9)		(-.45)		(-1.1)	
Husband's Period One Wage	-54	(3.4)	9.0	(1.0)	-34	(2.0)	16	(2.5)
	(-3.0)		(.29)		(-2.3)		(0.50)	
Wife's Education	12.3	(2.1)	10.2	(3.1)	5.0	(0.8)	7.7	(3.1)
	(2.7)		(1.3)		(1.3)		(.95)	
Husband's Education	7.7	(3.6)	-.64	(0.5)	4.5	(1.9)	-1.9	(2.2)
	(1.8)		(-.09)		(1.3)		(-.25)	
Wife's Year Born	-47	(3.4)	-22	(2.8)	10.9	(0.7)	-13.3	(2.3)
	(-.76)		(-3.6)		(.60)		(-2.0)	
Wife's Year Born Squared	.49	(3.7)	.16	(2.1)	-.11	(0.8)	.10	(1.7)
Husband's Year Born	6.8	(1.0)	-2.2	(0.6)	2.4	(0.3)	-5.3	(2.0)
	(-1.9)		(.24)		(-1.3)		(.92)	
Husband's Year Born Squared	-.10	(1.2)	.03	(0.7)	-.04	(0.5)	.08	(2.2)
D - South	-34	(2.4)	-19	(2.4)	-11.6	(0.7)	-5.1	(0.9)
D - SMSA	41	(3.1)	14.0	(1.9)	18	(1.3)	2.7	(0.5)
Unemployment Rate	-2.1	(3.0)	-.40	(1.0)	-1.6	(2.1)	-.13	(0.4)
R <sup>2</sup> (F)	.26	(28.5)	.03	(2.42)	.08	(6.68)	.06	(5.08)

Note: T-statistics are in parentheses next to the coefficients and elasticities are in parentheses beneath the coefficients.

Table 4

Coefficients of Variation and Correlation Coefficients  
for Wages and Labor Supply

<u>Coefficients of Variation</u>	<u>Period One</u>	<u>Period Two</u>
Husband's Wage	.216	.186
Wife's Wage	.236	.186
Sum of Wages	.213	.175
Husband's Labor Supply	.206	.153
Wife's Labor Supply	.726	.869
 <u>Correlation Coefficients</u>		
Husband's and Wife's Wage	.80	.74
Husband's and Wife's Labor Supply	.05	.04

Table B-1

Linear Regression Results for the Probability of  
Observing Wages

	<u>Women</u>				<u>Men</u>			
	Period	One	Period	Two	Period	One	Period	Two
Intercept	-29.2	(17.5)	-7.0	(3.8)	-0.73	(1.2)	0.48	(2.2)
Education	.030	(2.1)	.043	(11.1)	.215	(7.6)	.0425	(3.8)
(Education) <sup>2</sup>	.0013	(1.9)			-.002	(3.4)	-.0016	(3.3)
Education * Year Born					-.004	(6.9)		
Year Born	1.27	(18.0)	0.28	(3.6)	-.14	(3.2)	.004	(0.4)
(Year Born) <sup>2</sup> /100	-1.36	(18.4)	-0.26	(3.3)	0.86	(7.3)	-.0005	(0.0)
(Year Born) <sup>3</sup> /1000					-.106	(9.4)		
Socioeconomic Status <sup>a</sup>	-.15	(5.0)	-.17	(4.7)				
R <sup>2</sup> (F)	.25	(306)	.05	(60.1)	.40	(182)	.02	(6.9)
n	4,582		4,222		1,624		1,624	

Notes: <sup>a</sup> Socioeconomic status is an index of the status of the parental family of the women in the sample. It is not available for the men.

Table B-2

Linear Regression Results for Wages with and  
Without Selectivity Bias Correction

	<u>Women</u>							
	Period One		Period Two					
Intercept	-8.4	(2.5)	18.3	(1.6)	3.6	(0.9)	-3.8	(0.7)
Year Wage Measured	.20	(14.8)	.19	(14.7)	-.15	(7.0)	-.15	(7.0)
Year Born	-.13	(1.0)	-1.25	(2.6)	.39	(2.5)	.64	(3.3)
(Year born) <sup>2</sup>	.07	(0.5)	1.25	(2.5)	-.46	(2.9)	-.71	(3.6)
Education	.12	(20.2)	.08	(4.0)	.16	(23.0)	.19	(10.9)
D-Nonwhite	-.08	(3.3)	-.10	(3.9)	.02	(0.7)	.05	(1.5)
D-South	-.25	(11.0)	-.26	(11.2)	-.30	(9.7)	-.29	(9.2)
D-SMSA	.21	(8.7)	.21	(9.0)	.23	(7.3)	.21	(6.9)
Selectivity Correction			.87	(2.4)			-.93	(2.0)
R <sup>2</sup> (F)	.40	(233)	.40	(205)	.34	(174)	.34	(153)
n	2,447		2,447		2,334		2,334	

  

	<u>Men</u>							
	Period One		Period Two					
Intercept	8.1	(2.1)	-0.8	(0.2)	-3.6	(0.7)	-4.0	(0.7)
Year Wage Measured	-.07	(1.1)	.05	(0.8)	.03	(0.5)	.03	(0.4)
Year Born	-.06	(6.8)	-.03	(3.3)	.23	(4.5)	.24	(4.7)
(Year Born) <sup>2</sup>					-.38	(6.3)	-.37	(6.3)
Education	.14	(10.8)	.15	(11.2)	.14	(10.3)	.15	(9.0)
D-Nonwhite	-.37	(4.0)	-.37	(4.0)	-.40	(4.4)	-.40	(4.4)
D-South	-.44	(5.8)	-.44	(5.9)	-.44	(5.9)	-.44	(6.0)
D-SMSA	.53	(7.0)	.51	(6.8)	.44	(6.0)	.44	(6.0)
Selectivity Correction			1.04	(4.3)			-1.79	(1.1)
R <sup>2</sup> (F)	.26	(68)	.27	(62)	.26	(71)	.26	(62)
n	1,157		1,157		1,424		1,424	