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Geoffrey Carliner

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Geoffrey Carliner

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Geoffrey Carliner
Department of Economics
The University of Western Ontario
London Canada

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PERMANENT AND TRANSITORY WAGE EFFECTS IN A MULTIPERIOD FAMILY LABOR SUPPLY MODEL

I. Introduction

In his seminal paper, Mincer (1962) suggested that the current labor supply response to a temporary wage change should be different from the response to a permanent wage change. In a model in which utility is maximized over a lifetime of many periods, the temporary change would have a small lifetime wealth effect and possibly a large intertemporal substitution effect, while the permanent change would have a large wealth effect and no intertemporal substitution effect. However, recent papers by Heckman and MaCurdy (1979), Kalacheck, Mellow, and Raines (1978), and Lillard (1979) which used panel data to estimate multiperiod labor supply functions did not obtain these expected results. They found no significant difference between temporary and permanent wage effects, or differences that were the reverse of those predicted by the model.

This paper develops a multiperiod model in which husbands and wives jointly determine their labor supply over the lifetime.[1] The model predicts that an individual's one period labor supply response to a temporary and contemporaneous increase in the own wage should be more positive than the response to a permanent change in his wage. Using panel data from the National Longitudinal Survey of Older Men, permanent and temporary wage components are calculated for white married men and their wives. Coefficients from male labor supply regressions confirm the prediction that the temporary wage elasticity is positive, while the permanent own wage elasticity is negative.

This plausible result is in contrast to the findings of the three studies cited above. The estimation here differs from those studies in using a directly observed wage rather than one calculated from annual earnings and annual hours, and in restricting the sample to hourly and weekly wage workers who were eligible for overtime. Replications of the earlier findings indicate that negative coefficients on temporary wage components were obtained because of measurement error and because, for salaried workers, temporary wage fluctuations are the result rather than the cause of one period changes in hours worked.

II. Multiperiod Labor Supply and Measurement Error

To analyze labor supply decisions over time, household utility is defined as a function of consumption in successive periods of a composite household good.

(1) $U = U(C_1,\ldots,C_T).$

Time is assumed to be discrete rather than continuous, and the utility function is assumed to have continuous first and second derivatives. The composite household good is produced with inputs of husband's home time (X_t^m), wife's home time (X_t^f), and market goods (Y_t). The household production function is assumed to be weakly concave and to have constant returns to scale.

(2) $C_t = C(X_t^m, X_t^f, Y_t) \qquad t=1,\ldots,T$

Full wealth (F) is determined by the level of assets (V_1) owned by the household in the initial period, and by the value of wages for both spouses (W_t^m and W_t^f), discounted at the market interest rate r. The level of assets includes the capitalized value of transfers such as vested pensions and permanent disability transfers which do not depend on work effort. The budget constraint is that full wealth cannot be less than the discounted value of the household's purchases of home time and market goods. The market interest rate is assumed to be constant over time and exogenous to the household. Wage rates in all periods and initial assets are also assumed to be exogenous. The price of market goods is assumed to be the same in all periods, and equal to unity. The lifetime budget constraint can thus be written

$$(3) \qquad F = \sum_{t=1}^{T} (W_t^m + W_t^f)/(1+r)^t + V_1 \geq \sum_{t=1}^{T} (Y_t + W_t^m X_t^m + W_t^f X_t^f)/(1+r)^t$$

Substituting (2) into (1) and maximizing subject to the full wealth budget constraint (3) yields first order conditions for an interior maximum that can be used to derive input demand functions. The assumption of constant returns to scale in the household production functions implies that these demand functions for the i^{th} factor in the t^{th} period can be written as the product of a function of the prices of time and the level of demand for the t^{th} period consumption good.

$$(4) \qquad \begin{aligned} X_t^i &= f_i(W_t^m, W_t^f)C_t \cdot \qquad && i=m,f \\ Y_t &= f_y(W_t^m, W_t^f)C_t && t=1,\ldots,T \end{aligned}$$

The effect of a change in the wage rate in the s^{th} period on the demand for home time in the t^{th} period is

$$(5) \qquad \frac{\partial X_t^i}{\partial W_s^j} = C_t \frac{\partial f_i(\cdot)}{\partial W_s^j} + f_i(\cdot) \frac{\partial C_t}{\partial W_s^j} \qquad \begin{matrix} i,j=m,f \\ s,t=1,\ldots,T \end{matrix}$$

where $\partial f_i(\cdot)/\partial W_s^j (= 0 \text{ for } s \neq t)$ is the within period substitution effect in production. The last term in (5), the effect of a wage change on the output level of the home good, can be further decomposed into a substitution effect on consumption across periods and a full wealth effect.

$$(6) \qquad \frac{\partial C_t}{\partial W_s^j} = \left. \frac{\partial C_t}{\partial W_s^j} \right|_{u=u*} + L_s^j \frac{\partial C_t}{\partial F} \qquad \begin{matrix} j=m,f \\ s,t=1,\ldots,T \end{matrix}$$

where $L_s^j (= 1 - X_s^j)$ is the fraction of available time spent in the market by the j^{th} individual in the s^{th} period.

Since $\partial L/\partial W = -\partial X/\partial W$, we can obtain labor supply elasticities by substituting (6) into (5), using $C_t = X_t^i/f_i(\cdot)$ from (4), multiplying all terms by W_s^j/L_t^i, and multiplying the last term by F/F.

$$(7)\quad \frac{W_s^j}{L_t^i}\cdot\frac{\partial L_t^i}{\partial W_s^j} = -\frac{X_t^i}{L_t^i}\left[\frac{W_s^j}{f_i(\cdot)}\frac{\partial f_i(\cdot)}{\partial W_s^j} + \frac{W_s^j}{C_t}\frac{\partial C_t}{\partial W_s^j}\bigg|_{u=u^*} + \frac{W_s^j L_s^j}{F}\frac{F}{C_t}\frac{\partial C_t}{\partial F}\right] \quad \begin{matrix} i,j=m,f \\ s,t=1,\ldots,T \end{matrix}$$

Expressed in elasticity form, this becomes

$$(8)\quad \eta_{ts}^{ij} = -\frac{k_X^{it}}{k_L^{it}}\left(\phi^{ij} + \theta_{ts}^{j} + k_L^{js}\,\varepsilon_t\right) \quad \begin{matrix} i,j=m,f \\ s,t=1,\ldots,T \end{matrix}$$

where η_{ts}^{ij} is the uncompensated wage elasticity, ϕ^{ij} is the intraperiod substitution elasticity in production, θ_{ts}^{j} is the interperiod substitution elasticity in consumption, ε_t is the full wealth elasticity of demand for the composite good, and the $k_X^{it}(= W_t^i X_t^i/F)$ and $k_L^{it}(= W_t^i L_t^i/F)$ are the full wealth shares of home time and market work.

A. One Period Wage Elasticity

A household will react to a one period increase in the wage of one spouse by substituting other inputs to household production for that spouse's home time. It will also substitute consumption of the composite good in other periods for consumption in the period of the wage increase. Both these responses will tend to increase labor supply. On the other hand, consumption in all periods, and therefore demand for factors in all periods, will increase as a result of the income effect, which will tend to decrease labor supply.[2]

Since ϕ^{ii} and θ_{tt}^{i} will always be negative, and ε_t will be positive when the composite home good is normal, the uncompensated labor supply elasticity η_{tt}^{ii} will be positive if

$$(9)\quad -(\phi^{ii} + \theta_{tt}^{i}) > k_L^{it}\,\varepsilon_t$$

since an individual's earnings in one period will be a small fraction of lifetime full income (k_L small), there is a strong presumption that (9) will hold. Thus, the effect of a one period rise in the wage on own labor supply will in general be positive.

B. Permanent Wage Elasticity

In contrast, this prediction does not apply to a wage change in all periods. Suppose that the wage in any period has a permanent component (W^P) and a temporary component (W^T), which has an average value of zero and which is unrelated to the permanent component or to temporary components in other periods.

$$(10) \quad W_t = g(W^P, W_t^T) \qquad t=1,\dots,T$$

A change in W_t^T would thus affect only W_t, but a change in W^P would affect an individual's wage in all periods.

As analyzed above, the labor supply response to a change in W_t that occurred from a change in W_t^T is predicted to be positive. However, since a change in W^P would affect wage rates in all periods, there would be no intertemporal substitution effect ($\theta_P^i = 0$).[3] The wealth effect would depend on the full wealth share of earnings in all periods,

$$(11) \quad K_L^i = \sum_{t=1}^{T} W_t^i L_t^i / F$$

The condition for a positive value for the labor supply elasticity to a change in the permanent wage (η_P^{ii}) is thus

$$(12) \quad -\phi^{ii} > K_L^i \varepsilon_t$$

While it is theoretically possible for this condition to hold, it is less likely than for (9) to hold, since $K_L^i > k_L^i$ and $\theta_{tt}^i < 0$ but $\theta_P^i = 0$. Thus the presumption is that although labor supply in one period should increase in response to a temporary wage increase in that period alone, the response to a permanent change might be either positive or negative. In any case, the temporary wage response will be more positive than the permanent response.

C. Measurement Error

In estimating the separate effects of temporary and permanent wage changes, the errors in variables problem is especially serious, since it may be impossible to distinguish between a temporary wage fluctuation and measurement error. For salaried workers in all data sets and for all workers in some data sets, the hourly wage (W) must be calculated from reported annual earnings (S) and annual hours (H) worked. With lower case letters to indicate logs, the hourly wage calculated in this way is

$$(13) \quad \tilde{w} = s - h$$

If $g(W^P,W^T) = W^P W^T$, then true annual earnings ($s*$) will equal the product of true annual hours ($h*$) with the permanent and temporary wage components. In logs,

$$(14) \quad s* = h* + w^P + w^T .$$

Suppose that annual earnings and annual hours are measured with proportional errors, (e^s and e^h) which are independent of each other and all other variables. Then the calculated hourly wage is

$$(15) \quad \tilde{w} = s* + e^s - (h* + e^h) = w^P + w^T + e^s - e^h$$

Assume for the moment that the true labor supply function can be written

$$(16) \quad h* = \beta_o + \beta_1 w^P + \beta_2 w^T + u^h$$

where u^h represents the effects of omitted variables that are not correlated with the wage components.

Suppose a good measure exists for w^P, the permanent wage component, but that the temporary component must be calculated as

(17) $\tilde{w}^T = \tilde{w} - w^P = w^T + e^s - e^h$

Then when h is regressed on w^P and $\hat{w}^T$, the least squares estimate of β_2 is inconsistent.

$$\text{(18)} \quad \text{plim } b_2 = \beta_2 - \frac{\sigma_h^2 + \beta_2(\sigma_s^2 + \sigma_h^2)}{\sigma_T^2 + \sigma_s^2 + \sigma_h^2}$$

where σ_h^2, σ_s^2, and σ_T^2 are the variances of e^h, e^s, and w^T respectively.[4] Note that if β_2 is zero, plim b_2 will be negative. Even when β_2 is positive, plim b_2 will be negative if

(19) $\beta_2 \sigma_T^2 < \sigma_h^2$

In this paper, the hours equation will be estimated for workers paid by the hour or week from data which include a direct measure of the wage rate. Of course this observed wage also includes measurement error (e^w), but error that is independent of e^h.

(20) $\hat{w} = w^P + w^T + e^w$

Therefore, when $\hat{w}^T$ is calculated as before ($= \hat{w} - w^P$) and h is regressed on $\hat{w}^T$ and w^P, the plim of the new least squares estimate of β_2 will be

$$\text{(21)} \quad \text{plim } \hat{\beta}_2 = \beta_2 - \frac{\beta_2\sigma_w^2}{\sigma_T^2 + \sigma_w^2}$$

where σ_w^2 is the variance of e^w. Thus $\hat{\beta}_2$ will be closer to zero than β_2, but it will have the same sign as β_2. Moreover, the inconsistency in $\hat{\beta}_2$ will be smaller than the inconsistency in b_2 if the variance in the observed wage error is no larger than the variance in observed annual earnings error ($\sigma_w^2 < \sigma_s^2$) and if

(22) $\sigma_T^2 + \sigma_h^2 > -\beta_2 \sigma_T^2$

Since β_2 is presumed positive, this will in general be true.

III. Estimation

The model in the preceding section predicts that the labor supply response to a temporary wage change that is unrelated to wage rates in other periods will be positive. In contrast, the labor supply response to a permanent wage change will be less positive, and may be greater or less than zero. This section defines measures of permanent and temporary wage components to test these hypotheses.

In one period cross section data, differences in wages across individuals reflect permanent as well as temporary differences. The former include the effects on wage rates of education, location, race, and ability. The latter include fluctuations which vary across individuals and do not persist over time. In a time series on one individual, the permanent wage would change as the individual ages and as productivity rises throughout the economy, and of course the temporary wage would also change.

Empirically we specify that the log of the market wage (w) depends on observable exogenous variables such as education, experience, location and trend (Z), and on two unobservable terms (u_i^w and v_{it}^w)

(23) $w_{it} = \alpha Z_{it} + u_i^w + v_{it}^w$ $\qquad i=1,\ldots,N \quad t=1,\ldots,T$

where i indexes individuals and t indexes time periods.

The u_i^w are uncorrelated across individuals, but are constant over time periods. They reflect persistent differences among individuals in omitted or unobservable variables such as ability. This component, together with the effects of observable characteristics constitutes the permanent part of the observed wage ($w_{it}^{P} = \alpha Z_{it} + u_i^w$). Note that this permanent component is not constant over time, but changes with general wage levels as captured by the trend term, and with the individual's age and other observable characteristics. The other unobserved component of the measured wage, v_{it}^w, is uncorrelated across time periods. It reflects variation that is specific to a given individual in a given period. The v_{it}^w may include both random measurement error (e^w) and real but temporary wage fluctuations (w^T) that do not persist across time periods.

Although indistinguishable in one period cross sections, the two wage components can be estimated with panel data on individuals in several periods. An ordinary least squares regression of w on Z for all individuals in all time periods will yield consistent estimates of the α's. With these results, the individual specific error component (u_i^w), the permanent component of the wage rate (w^P), and the temporary component can be estimated from

$$(24) \quad \hat{u}_i^w = \frac{1}{T} \sum_{t=1}^{T} (w_{it} - \hat{\alpha} Z_{it})$$

$$(25) \quad \hat{w}_{it}^P = \hat{\alpha} Z_{it} + \hat{u}_i^w \qquad i=1,\ldots,N$$

$$(26) \quad \hat{v}_{it}^w = w_{it} - \hat{w}_{it}^P \qquad t=1,\ldots,T$$

With values for both the permanent and temporary wage components, we can now specify the labor supply regression to be estimated.

$$(27) \quad L_{it} = \alpha_0 + \alpha_1 w_{it}^{mp} + \alpha_2 v_{it}^{mw} + \alpha_3 w_{it}^{fp} + \alpha_4 v_{it}^{fw} + \alpha_5 \text{Age}_{it} + \alpha_6 \text{Ed}_i + \alpha_7 \text{Dep}_{it} + \alpha_8 \text{Health}_{it} + u_i^h + v_{it}^h$$

A man's labor supply depends on his own (w^m and v^m) and his wife's (w^f and v^f)

permanent and temporary wage rates, on his age, education, number of dependents, health, and on two unobserved components. Education may capture nonpecuniary aspects of jobs, and is expected to have a positive effect on labor supply. Age, dependents, and health may affect the household production function. For men in the sample used for estimating equation (27), poor health and age are expected to decrease labor supply, while the number of dependents should increase it.

Finally, the error term again includes individual specific (u_i^h) and observation specific (v_{it}^h) components. The u_i^h are independent across individuals but the same for an individual over time, while the v_{it}^h are uncorrelated across individuals and time periods. The u_i^h reflect differences among individuals in tastes for market goods or home time that are stable over time and not attributable to differences in observable characteristics. They are similar to the concept of heterogeneity used by Heckman and Willis (1977, 1979) and Mincer and Ofek (1979) in connection with patterns in labor force participation over time. Not finding heterogeneity is equivalent to finding the u_i^h equal to zero for all individuals. Like the observation specific error component in the wage equation, v_{it}^h may include both random measurement error as well as real but temporary fluctuations in the individual's labor supply.

IV. Data and Results

Previous estimates of multiperiod labor supply functions, including Heckman and MaCurdy (1979) and Lillard (1979), have used panel data sets in which the only measure of the wage rate was one calculated from annual earnings and annual hours. Measurement errors in their wage variable are therefore correlated with measurement errors in their dependent variable, with bias shown by equation (18) above. The National Longitudinal Survey of Older Men, used in this paper, contains a direct question on the individual's hourly wage rate in four of the six survey years that is not based on the labor supply measure used in the regressions below. Although my wage variable may also contain measurement error, the inconsistency is of the type shown in equation (21), and thus will not result in estimated wage coefficients with incorrect signs.

The NLS is limited to men who were 45 to 59 in 1966, the first year of the survey. To avoid complicated interactions betweeen race, marital status, and other variables, the sample used here was restricted to married white men. Several other criteria were used to exclude observations for whom the model presented above might not apply. Because self employment income includes both labor and capital income, an individual with more than $1000 in business or farm income was dropped from the sample. Small numbers of men with no reported wage rate, including nonworkers, were also excluded. The most important criterion in terms of numbers was the exclusion of all men not paid by the hour or week. It was felt that the labor supply model presented above might not fit the behavior of workers paid a monthly or annual salary. Although the labor supply of salaried workers may depend on their rate of pay in the long run, in the short run their earnings are fixed. A temporary increase in the hourly wage, however computed, will be the result, not the cause, of a temporary decrease in hours worked by such workers. Finally, workers who reported that they were ineligible for overtime were also excluded, since their choice of hours in the short run was somewhat limited by company policies. The resulting sample contained 680 men in 1966.

The first step in analyzing the labor supply of these men was to estimate their own wage equation and that of their wives. The independent variables, sample selection rules, and results are discussed in the Appendix. Once wage coefficients were estimated, measures of the stable (w^P) and temporary (v) wage components for men and their wives were calculated to equations (25) and (26). The other independent variables in the labor supply regressions included the education, age, and health of the individual, and the number of dependents.

From the numerous labor supply measures available in the NLS, only three were suitable for estimating the labor supply equation (27): The number of weeks worked in 1966; 1966 weeks worked times the number of hours worked during the survey week in 1966; and survey week hours in 1966, 1967, 1969, and 1971.[5] In all regressions, the log of these measures was used as the dependent variable. Since all wage variables are also in logs, the wage coefficients are labor supply elasticities. Regressions were run separately for married men whose wives worked outside the home and for married men whose wives did not. For the first group, the wife's stable and temporary wage components were included in the regression, (w^f and v^f) but for the second group no such variable was used, since the shadow price of time is endogenous for nonworking wives.

Because data on annual weeks and annual hours were available only for one year, the regressions on these two dependent variables were estimated by OLS, with an error term of $u_i^h + v_{i,66}^h$. The coefficients from these regressions, with standard errors in parentheses, are presented in Table 1. As expected, the coefficients on the husband's stable wage component are all negative, significant, and very close for the two groups of married men. The own stable wage elasticity for annual weeks is about -.08, and the elasticity,

TABLE 1

Annual Weeks and Hours Regressions

	Annual Weeks		Annual Hours	
	Wife Doesn't Work	Wife Works	Wife Doesn't Work	Wife Works
w^{mp}	-.097 (.040)	-.078 (.036)	-.297 (.058)	-.291 (.060)
$\tilde{v}^{m}$	.058 (.093)	.280 (.072)	-.062 (.134)	.406 (.122)
w^{fp}	--	.021 (.029)	--	-.002 (.048)
v^{f}	--	-.023 (.045)	--	-.073 (.076)
Age	-.001 (.003)	.002 (.003)	-.005 (.005)	-.003 (.004)
Education	.016 (.005)	.001 (.004)	.029 (.007)	.007 (.007)
Dependents	-.001 (.009)	-.008 (.007)	.003 (.013)	-.007 (.012)
Health	-.063 (.035)	-.085 (.028)	-.104 (.051)	-.080 (.047)
Constant	3.926	3.876	7.945	8.084
R^2	.03	.06	.09	.08
NOBS	368	312	368	312

for annual hours is just under -.3. The temporary wage elasticities, however, were quite different for the two samples. Married men with working wives had own temporary wage elasticities of .28 and .41 for annual weeks and annual hours, both significant, but married men with nonworking wives had temporary wage elasticities that were insignificant and close to zero.

These results support the predictions of the model: The stable own wage elasticity is substantially more negative than the temporary elasticity. The wealth effect of a permanent change in the wage outweighs the within period substitution effect, and the stable wage elasticity is negative. However, the intraperiod substitution effect plus the cross period substitution effect outweigh the small wealth effect of a one period change in the wage, and the temporary wage elasticity is generally positive. These results are also consistent with Kneisner's (1976) hypothesis that the own substitution effect will be more positive for men with working wives than for other married men. The stable wage elasticities include large wealth effects, and are very close for the two groups, but the temporary elasticities are mostly substitution effects and are much larger for men with working wives.

To see if my results differed from those of Heckman and MaCurdy (1979) and Lillard (1979) because of differences in the calculation of the wage components or differences in sample restrictions, two additional sets of regressions were run. The first was estimated on the same sample as before but used wage components derived from measures of annual earnings and annual hours. The second used a direct measure of earnings per pay period but was estimated on a sample of workers paid by the month and year as well as by the hour. In both sets of regressions, the coefficients on the permanent own wage component were negative and generally significant, while the coefficients on the temporary component were also generally negative but never significant. Thus the use of either a poor wage variable or a sample for which the multiperiod model is not applicable will lead to implausible coefficients for the temporary wage component.

Because data on hours worked during the survey week were available in four years, it was possible to estimate labor supply equations using this dependent variable under assumptions that heterogeneity in the labor supply equation does ($u_i^h \neq 0$) or does not ($u_i^h = 0$) exist. Generalized least squares estimation is the appropriate technique if an individual specific error component exists, while ordinary least squares on observations for all individuals in all time periods is appropriate if all error terms are observation specific. Labor supply regressions under both assumptions are presented in Table 2.[6]

These results also confirm the prediction of a positive temporary wage elasticity and a more negative stable wage elasticity. All four of the former were positive, and all four of the latter were negative. However, only the stable wage elasticities for men with nonworking wives were significantly different from zero. Furthermore, the temporary wage elasticities for these men are larger than for men with working wives, and thus do not support Kneisner's hypothesis. Moreover, unlike the small and insignificant cross wage elasticities in the annual weeks and annual hours regressions, and Kneisner's small but positive estimates from the same data, the elasticity of weekly hours to the wife's stable wage was negative, significant, and quite large.[7] This result confirms Ghez and Becker's (1975) finding that home time of husbands and wives are substitutes.

Of the remaining independent variables in the labor supply regressions, only health had a consistently significant effect. Each additional year of age increased survey week hours by about two percent, but age had no significant effect on annual weeks or annual hours. The education coefficients, on the other hand, were significant in the annual weeks and annual hours regressions for men with nonworking wives, but not in the other regressions. In regressions not presented here, coefficients on the log of nonlabor income were insignificant, and the coefficients on the other variables were little changed from the values shown in Tables 1 and 2.[8]

TABLE 2

Survey Week Hours Regressions

	OLS		GLS	
	Wife Doesn't Work	Wife Works	Wife Doesn't Work	Wife Works
w^{mp}	-.370 (.107)	-.080 (.114)	-.399 (.130)	-.204 (.143)
v^{m}	.290 (.263)	.154 (.288)	.317 (.244)	.196 (.279)
w^{fp}	--	-.265 (.089)	--	-.271 (.113)
Age	-.013 (.008)	-.014 (.009)	-.024 (.010)	-.017 (.010)
Education	.015 (.013)	.005 (.014)	.016 (.016)	-.001 (.017)
Dependents	-.014 (.022)	-.046 (.024)	-.023 (.026)	-.043 (.030)
Health	-.406 (.089)	-.405 (.097)	-.262 (.093)	-.333 (.106)
Constant	4.336	4.403	4.985	4.749
R^2	.02	.02	--	--
NOBS	1391	1166	1327	1108

Finally, estimates of the variances of the error components suggest that heterogeneity is important in accounting for unexplained differences in hours worked by older men. Because the same man could be in either sample during the four survey periods, these estimates were calcualted on the assumption that the u_i^h and the v_{it}^h for the two groups of married men all came from the same normally distributed populations, and that $E(v) = E(u) = E(vu) = 0$. The estimated variance for the individual specific component (s_u^2) was 0.15, the observation specific error variance (s_v^2) was 0.51, and the total residual variance was 0.66. Thus over one-fifth of the unexplained variance per week was due to differences among men which persisted over time periods, while the remainder included measurement error and random fluctuations.[9]

V. Conclusion

This paper develops a model in which the household's utility depends on the level of the composite good produced in each period with inputs of husband's and wife's home time and market goods. Given the full wealth budget constraint, two wage elasticities are derived. The elasticity of an individual's labor supply with respect to a one period change in his own wage includes substitution in consumption across periods, substitution of his home time for other inputs to household production within the period, and a small wealth effect. The labor supply elasticity with respect to a permanent change in the wage in all periods includes only within period substitution and a large wealth effect. Thus the temporary elasticity is predicted to be more positive than the permanent wage elasticity, and presumably larger than zero.

Previous estimates of multiperiod labor supply models, including Heckman and MaCurdy (1979), Kalacheck, Mellow, and Raines (1978), and Lillard (1979), have not found these expected results. Their temporary wage elasticities were either more negative than the permanent elasticities or virtually the same. By contrast, the findings presented above confirm the predictions of the model. In regressions using a variety of labor supply measures, all permanent wage elasticities for a sample of older married white men were negative, while all but one of the estimated temporary wage elasticities were positive. The two elasticities were significantly different in half the regressions.

The contrast between my results and the earlier ones may be due to differences in the wage variable used. This study used a directly observed measured wage to estimate permanent and temporary wage components, while Heckman and MaCurdy and Lillard used annual earnings divided by annual hours. It is shown above that measurement error in such a wage variable may lead to a negative estimate of the temporary wage elasticity even if the true value is positive. Measurement error in my variable may result in an estimated coefficient that is closer to zero than the true value but will not lead to an estimate with the wrong sign.

The other findings of this paper are a significantly negative permanent cross wage elasticity of wife's wage on husband's weekly hours, but small and insignificant effects on other measures of husband's labor supply. Health, age, and education affect labor supply directly, as well as indirectly through their effect on wage rates. Finally, persistent differences among individuals account for over one fifth of the unexplained variance in the log of weekly hours, while temporary fluctuations or measurement error account for the remaining four fifths.

APPENDIX

This appendix discusses the men's and wives' wage regressions used to estimate the stable (w^{mp} and w^{fp}) and temporary (v^{mw}) wage components. The dependent variable in both regressions was the log of the hourly wage rate in constant (1976) dollars. The men's wage was observed directly, but the wives' wage rate was calculated from data on annual earnings and annual hours. For men, sample selection rules were the same as for the labor supply regressions. However, women were not excluded if they were salaried workers or if they were ineligible for overtime. Observations but not individuals were also excluded if the wage was not reported during a given year or if its log did not lie between -1 and 3. The men's wage sample included 3115 observations from four survey years, while the wives' sample included 4912 observations from five survey years.

In the men's regression, the independent variables included education, experience, experience squared, a trend term and dummy variables for poor health, for living in the South, in a labor market with more than one million workers (Big) or fewer than 50,000 (Small). The education, experience, and health variables were included to reflect differences in individual levels of human capital. The location and trend variables were included to reflect possible differences in prices or in labor market demand.

Because the standard experience variable (age minus years of school minus six) is such a poor measure of the actual labor market experience of married women, several alternative specifications were tried, including linear and quadratic age and experience, and dummies for six age categories. The coefficients on these terms were small and insignificant, and were not included in the final regression used to impute the wives' stable wage component. However, the number of children ever born (of the husband, unfortunately) was included as a proxy for the human capital depreciation incurred during time out of the labor market. The other independent variables were the same in the men's and wives' regressions, which are presented in Table A.

Except for the experience terms in the men's regression, all coefficients in both regressions have the expected signs and are significant. Unlike results for samples of men of all ages, the experience-wage profile of men 45 to 61 is convex, reaching a minimum at 53 years of experience. Returns to education, and wage differentials by health status, labor market size, and region are similar for men and women and similar to other published results.

TABLE A

WAGE REGRESSIONS

	Men	Wives
Education	.021 (.003)	.069 (.003)
Experience	-.010 (.013)	--
$Ex^2/1000$	.100 (.177)	--
Health	-.088 (.017)	-.052 (.024)
South	-.160 (.016)	-.082 (.018)
Big	.028 (.015)	.106 (.022)
Small	-.118 (.014)	-.151 (.018)
Kids	--	-.025 (.005)
Trend	.028 (.003)	.026 (.002)
Constant	1.145	-.057
R^2	.15	.16
NOBS	3115	4912

Note: Standard errors in parentheses.

FOOTNOTES

[1]Ghez and Becker (1975), Blinder and Weiss (1976), Heckman (1976), and Ryder, Stafford, and Stephan (1976) have used multiperiod labor supply models to analyze life cycle factors and the simultaneity of labor supply and human capital decisions. These issues will not be examined in this paper.

[2]A wage increase for either spouse in one period will have a negative effect on the labor supply of either spouse in another period, since θ_{ts} is positive for $t \neq s$, $\mathcal{E}_t$ is positive when the composite home good is normal, and there is no intraperiod substitution. The effect of a wage increase for one spouse on the labor supply of the other spouse is ambiguous, since with three factors home time of the two spouses can be net substitutes ($\phi^{ij} > 0$) or complements ($\phi^{ij} < 0$) for $i \neq j$.

[3]Strictly speaking, unless the household production function is Cobb-Douglas, or the W^T are the same in all periods, a permanent wage change will have an interperiod substitution effect. However, this effect will be samll enough to neglect. To see this, note that a proportional change in the price ($\pi_t = W_t^m f_m + W_t^f f_f + f_y$) of the compositive household good in all periods would have no interperiod substitution effect, since the sum of compensated price elasticities is always zero. The effect of a wage change on π_t depends on the share of home time in the cost of the household good ($W_t^i X_t^i / \pi_t C_t$). These shares will be constant for the ith spouse, and therefore equal in all periods, if the household production function has $\sigma = 1$, but not otherwise. However, even if σ does not equal one, in practice differences in shares will be small, since the variance in the temporary wage component is about one fifth of the variance of the permanent wage component. Thus regardless of the value of the elasticity of substitution in household production, the interperiod substitution effect of a permanent wage change will be of second order importance.

[4] If w^T is considered nonrandom, σ_T^2 is simply $\Sigma(w^T)^2$.

[5] Results for all three dependent variables are presented because none of them is a perfect measure of labor supply. Better data on usual hours per week and weeks per year for most of these years cannot be used, since these variables are for work during the year prior to the survey. The wage variable refers to the current wage. Only for 1966 does the NLS provide information in the wage (from the 1966 survey) and annual weeks (from the 1967 survey). Unfortunately, 1967 was the only survey year in which usual hours is not available.

[6] Sample selection rules discussed above were applied to observations, not to individuals. In order to avoid problems introduced by the convex budget constraint faced by men eligible for Social Security pensions, observations were also excluded if the individual was 62 or over. This did not occur until the 1969 survey.

[7] No temporary cross wage elasticity could be estimated because data on the wife's wage were not available for 1967, 1969 or 1971, the years for which data on the husband's wage and survey week hours existed.

[8] These results are available on request.

[9] To see if period specific effects were important, dummy variables for three of the four periods were also included in a set of weekly hours regressions. However, their coefficients were small and insignificant, and the coefficients of the other variables were similar to those presented in Table 2.

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