The Economics of Labor: An Assessment of Recent Research

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by

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The last time that I presented a paper at a joint session of the AEA and IRRA was 18 years ago, at the Christmas meetings of 1956. The paper was entitled "Hours of Work and Hours of Leisure" and the session was devoted to the "shorter work week," an expression that I interpreted as short-hand for a declining trend in the fraction of a worker's lifetime spent in labor market activities. I note that in the bibliography of Cain and Watts recent (1973) book on labor supply only three entries precede "Hours of Work" in time: Lord Robbins' often-cited paper of 1930 and two entries, both in the 1930's, for Paul Douglas. I say this not to claim credit for what followed after 1956, but to suggest that in 1956 the stock of recent research on labor supply was rather small.

By 1957, however, there was certainly widespread familiarity among economists with the notion of deriving demand functions for commodities, including household time, by maximizing a utility function subject to a budget restraint, along with the related ideas of income elasticities and compensated and uncompensated own- and cross-price elasticities. The permanent income hypothesis already was circulating among economists. Simultaneous equations econometrics was still somewhat new, but least squares and maximum likelihood were not. Talented theorist-econometrician types already were discovering that there was much room in labor economics for the exercise of ingenuity in economic and econometric analysis and in relating real data to their analysis. The electronic computer was at hand ready to process the large sets of data on individuals and
families that were to come with the 1960 and 1970 population censuses, the Survey of Economic Opportunity and the National Longitudinal Surveys.

Undoubtedly the widespread interest in the negative income tax that began in the mid-60's and the negative income tax experiments that followed stimulated a substantial amount of research on hours of work, but much of the empirical and theoretical work in the last 18 years on the economics of time surely was simply the result of economists' curiosity about the real world and their eagerness to test new ideas about econometric methods or new economic hypotheses, including ideas about the way data relate to economic analysis.

In contrast to 1956, we now have a large stock of recent research on hours of work economics. The Cain-Watts bibliography covers almost five pages and I judge from items not listed there that recently have come to my attention, that it will be easy to double or even, perhaps, triple the length of the bibliography without including items only peripherally related to hours of work. (Much of the recent work on the economics of time is concerned mainly with other subjects such as human capital, including migration and search, commodity demand analysis, human fertility, health, and mortality, marriage and divorce. I do not deal with any of these in this paper.) Perhaps the most notable new entry would be the Watts and Rees Final Report of the New Jersey Graduated Work Incentive Experiment, containing at least 30 papers, covering over 1,800 pages, and comprising a volume of roughly 800 cubic inches—or should I say "cubic splines".

For me the trail markers in this recent research are Long's 1958 book on the labor force; Mincer's 1963 paper on the labor force
participation of married women; Becker's 1965 paper on the allocation of time; Bowen and Finegan's massive volume of 1967 on labor force participation; the Becker-Ghez monograph on the allocation of time and goods over the life cycle, which has been circulating in manuscript for several years, but is not yet published; Heckman's unpublished but forthcoming paper on shadow wages, market wages, and labor supply; the Cain-Watts volume of 1973 which contains 9 papers by a total of 13 economists, and the Watts-Rees Final Report of 1974.

Clearly the time has come for a careful evaluation of the empirical component of this recent research. We now have literally hundreds of empirical labor force participation, weeks worked, hours worked per week and per year equations. What can they do for us in understanding time series variations in these various dimensions of labor supply? Differences in labor supply behavior among countries? Within countries by sex and other divisions of the population? The consequences of a national negative income tax scheme? Can the results of these studies be synthesized to yield a small number of empirical utility functions and budget restraints from which we may derive labor supply functions that will give us good answers to such questions?

When belatedly I began the preparation of this paper, I became acutely aware that a convincing evaluation could not be accomplished single-handedly within a few weeks and the scope of a short paper, even with the help of the recent DaVanzo-DeTray-Greenberg sensitivity analysis and Cain and Watts' effort at summary and synthesis. The sheer bulk of the pertinent literature and the seeming diversity of its findings is
simply too great. Even now I have not read much of this literature, to say nothing of having studied, reflected upon, and reconciled it. I agreed reluctantly to prepare today's paper, but the assignment has aroused my curiosity so much that in the months ahead I am going to try to put the hours of work puzzle together. I am encouraged by an earlier, somewhat similar experience—that of evaluating research on the relative wage effects of unionism—to think that a substantial part of the puzzle can be assembled. What follows in this paper, therefore is not a completed evaluation, but impressions, and these will be focussed mainly on the negative income tax experiments.

One becomes most aware of the diversity of findings, of course, in a context such as that of predicting with some numerical precision the consequences of a negative income tax (NIT) scheme. For such a problem it can make a great deal of difference whether a relevant elasticity is 0.05 or 0.25. Yet it is important that we not lose sight of the forest because of the differences among the trees. We have come a long way toward understanding the division of labor within the family, not in detail family by family, but on the average, and this is no mean accomplishment. The findings here are so well known, I judge, that I won't try to summarize them. Furthermore, I have the impression that there is a considerable degree of agreement that long-run uncompensated own-wage elasticities of hours worked by married, "prime-age" males are negative and numerically closer to zero than to unity: a figure such as -0.15 is, I think, in the ballpark. However, for the NIT problem we need to know more—the
corresponding income elasticity, for example, and here my impression of the findings is one of marked diversity.

I turn now to the NIT experiments, especially the Final Report of the New Jersey-Pennsylvania experiment. First three general comments:

1. The Final Report almost defies anyone to study it. There is no detailed subject index, no list of tables, no detailed statistical appendix in which one can find answers to such questions as: What proportion of the white, continuous husband-wife experimental families, not on welfare, received no NIT payments at all? One such payment? Two? And so on. Or what proportion of the male heads were multiple job holders? I am pleased to hear that the Final Report is not the last report. I trust that the next Final Report will correct this defect of the first Final Report.

2. The four NIT experiments (New Jersey-Pennsylvania, Rural, Gary, and Seattle-Denver) are producing a unique set of panel data in which low-income families are presented with an alternative budget restraint involving much lower net wages and much higher non-wage income than their usual budget restraint. I hope that the data emerging from these experiments will be made generally available on tape or cards.

3. It should be surprising to some economists to learn that a final report on the first of the experiments already is available. The New Jersey-Pennsylvania experiment was designed, of course, to provide NIT payments to eligible families for only three years and the last such
payment was made in September 1972. But presumably an NIT experiment has income effects and inter-temporal substitution effects not only during the experimental (or payment) period, but after it as well. I am disappointed that the experiment was not designed to continue the data assembly and analysis for a post-experimental period of two or three years at least, and hope that some such effort will be made in one or more of the other experiments. Furthermore, the certain prospect this year of an NIT budget restraint option in the fairly near future will have income and substitution effects on this year's behavior of some families. Here, too, I am unhappy that some of the experimental families were not told at their enrollment in the experiment that, say, three years later they would become eligible for NIT payments for a period of three years, and data gathered and analyzed for the pre-experimental as well as the experimental period.

What did the New Jersey-Pennsylvania experiment discover? Although the counter-intuitive findings for Black families and, to a lesser extent, those for the Spanish-speaking families are a puzzle that deserves further study, I discuss here only the results for White families. First some figures for the White, continuous husband-wife, experimental families just preceding their enrollment in the NIT experiment. Family size averaged close to six persons with an average of one to two children less than six years of age. Mean family hours of work per week was 42, mean family earnings $100 per week, mean family income $111 per week, with 23 per cent of the families below the poverty income line, 34 per cent at 100-124 per cent of the line, and 43 per cent at 125-150 per cent of the line. The male heads averaged 36 years of age and 10 years of schooling, 97 per cent
were labor force participants of whom five to six per cent were unemployed; their mean hours of work per week was 35 and their mean wage about $2.50 per hour. Only one-sixth of the wives were labor force participants and the wives averaged about four hours of work per week and a wage of about $2.10. The guarantees and implicit tax rates of the NIT schemes for these families varied from family to family; the mean guarantee was 90 per cent of the poverty line and the mean tax rate was 51 per cent. Most of these families resided in Scranton, Pennsylvania.

At first blush the low labor force participation rates for the wives and large family size may appear surprising. Recall, however, that only families with able-bodied male heads 18 to 58 years of age and with a 1968 family income not in excess of 150 per cent of the poverty line were enrolled in the experiment and that the poverty line increased with family size.

Under a national NIT scheme of the kind examined in the experiment, many families will never choose the NIT option—that is, they will behave in such a way that they do not receive NIT payments at any time in their lifetime. We would like the experimental findings to tell us, first of all, the characteristics—in terms of family size, non-wage income, and wage profiles—of such families as they relate to the NIT parameters (guarantee, tax rate, poverty line). Second, for the families who would receive NIT payments, we would like to know their hours of work response to the NIT, both during the payment periods and at other times, stated as a function of the NIT parameters and the family's non-wage income, wage, and other relevant characteristics. That is, we would like the
findings to come in the form of a response function that will tell us who will opt for the NIT and their responses.

The research staff of the experiment tried diligently to estimate such a function for responses during the three-year experimental period. For male heads of families with an average "normal" income (about 120 per cent of the poverty line) under an NIT scheme with a guarantee of 100 per cent of the poverty line and a 50 per cent tax rate they estimated that the effect of the NIT on mean hours of work per week was a reduction of about 2-1/2 hours during the middle eight quarters of the experiment and about 7-1/2 hours during the last year. The disincentive effects, they estimated, were negligible for families with normal income near the breakeven level of their NIT plan, but rose markedly as normal income declined below the breakeven level. The estimated disincentive effects also rose substantially as the tax rate increased or the guarantee fell. (The reduction in hours for a 50/70 plan was roughly three times that for a 100/50 plan.) The last result, of course, is surprising, demands explanation, and casts a cloud of uncertainty over the estimated response surface.

For the wives in these families, the labor force participation rate fell, because of the NIT, from about one-sixth to about one-twelfth and hours worked from about four per week to about two. The measured disincentives were greatest during the first two years, there was a general tendency for the disincentives to increase with the NIT guarantee, but variation in the NIT tax rate produced little variation in measured response. There is some evidence that the disincentive effects increased as normal income increased, a result that is not so surprising as at first it may seem.
Some of the derivatives of the estimated response functions with respect to guarantee, tax rate, and family income capacity are highly questionable and this is unfortunate. But put derivatives aside and simply evaluate the functions for intact White families with able-bodied male heads 18 to 58 years of age near the center of gravity of the experiment's observations (guarantee of 100 per cent of the poverty line, tax rate of 50 per cent, "normal" income about 120 per cent of the poverty line). Are the estimated responses that I have cited what we can expect for such families under a national and permanent NIT with the same parameters during periods in which they are receiving payments? I see no reason for supposing that these estimates are grossly misleading for a national, permanent NIT during its initial years for such families that expect to receive the NIT payments only temporarily—that is, for a relatively small fraction of their remaining working years. I would expect the disincentives to become somewhat larger after the NIT had become more familiar and better understood and especially to be larger for families expecting to receive NIT payments more or less permanently.

For illustrative purposes consider the following lifetime utility function and budget restraint for a *husband(m)-wife(f)* family:

Utility function: $u = \left( \prod_{t=1}^{n} u_t^{\sigma-1} \right)^{\sigma}$, where $\sigma$ is either zero or 0.2;

$u_t = \min(u_{m_t}, u_{f_t})$; $5u_m = (5r^{-1} + x_{m_t}^{-1})^{-1}$; $u_{f_t} = (5r_{f_t}^{-1} + x_{f_t}^{-1})^{-1}$

Budget restraint: $A + \sum_{t=1}^{n} 100(w_{m_t} + w_{f_t}) = \sum_{t=1}^{n} \pi_t u_t$;
where \( y \) denotes utility, \( t \) the week in a remaining \( n \)-week lifetime, 
100 is the assumed number of hours per week disposable for either 
"leisure" time \( l \) or market work; \( x \) is market goods consumption, the 
\( w \)'s are real market wage rates per hour in terms of market goods, \( A \) 
is initial net real assets, \( v \) is the shadow price of \( u \), and I assume 
for simplicity a zero interest rate. The illustration is a simplification, 
to put it mildly, of the Becker-Ghez model and the substitution elasticities 
in the illustration are not those estimated by them, though they are not, 
I think, preposterously different.

Assume that \( A \) is zero and that \( w \) and \( v \) do not vary over the 
lifetime, with \( w_m = \$2.56/\text{hour} \) and \( w_r = \$1.64/\text{hour} \). At these values the 
husband works 40.4 hours per week, the wife 16.8 hours, and together 
they earn \$130.91 per week. I take these as the base values for 
measuring the impact of the NIT.

Now offer the family a permanent NIT option with a 50 per cent tax 
rate and a weekly guarantee of \$67.50 (a weekly breakeven of \$135.00).

Turn to table 1, row 1. The first 6 columns show the ratio of hours 
worked under this NIT experiment to base hours. The husband's hours 
fell by 30 per cent and the wife's by 62 per cent.

Suppose that the preceding NIT option is offered now for a period 
amounting to one-fifth the expected remaining lifetime of the family. 
Then the lifetime income effects of the NIT are smaller than on 
line (1), but there may be inter-temporal substitution effects as well. 
There are no inter-temporal substitution effects on line (1). Line (2) 
assumes that the inter-temporal substitution elasticity \( \sigma \) is zero, so
| Experimental Period and Value of $\hat{\sigma}$ | Lifetime: $\hat{\sigma}$ Irrelevant | $^{a}$ | $^{b}$ | Lifetime; $\hat{\sigma}$ = 0 | $^{a}$ | $^{b}$ | $^{a}$ | $^{b}$ | $^{a}$ | $^{b}$ | $^{a}$ | $^{b}$ | $^{a}$ | $^{b}$ |
|---------------------------------------------|-----------------------------------|-----|-----|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lifetime; $\hat{\sigma}$ = 0.2              | 0.62                              |      |      | 1.01                         |      |      |      |      |      |      |      |      |      |      |      |
| Lifetime; $\hat{\sigma}$ = 0.99            | 0.996                             |      |      | 0.995                        |      |      |      |      |      |      |      |      |      |      |      |
| Lifetime; $\hat{\sigma}$ = 0.99            | 0.99                             |      |      | 0.996                        |      |      |      |      |      |      |      |      |      |      |      |
| Lifetime; $\hat{\sigma}$ = 0.99            | 0.99                             |      |      | 0.996                        |      |      |      |      |      |      |      |      |      |      |      |
| Lifetime; $\hat{\sigma}$ = 0.8              | 0.62                              |      |      | 1.01                         |      |      |      |      |      |      |      |      |      |      |      |
| Lifetime; $\hat{\sigma}$ = 0.99            | 0.996                             |      |      | 0.995                        |      |      |      |      |      |      |      |      |      |      |      |
| Lifetime; $\hat{\sigma}$ = 0.99            | 0.99                             |      |      | 0.996                        |      |      |      |      |      |      |      |      |      |      |      |
| Lifetime; $\hat{\sigma}$ = 0.99            | 0.99                             |      |      | 0.996                        |      |      |      |      |      |      |      |      |      |      |      |

- **Note:**
  - $^{a}$ See text for explanation.
  - $^{b}$ By assumption; see text.
that line (2) differs from line (1) during the experimental period only in having smaller income effects. Hence during the experimental period hours worked fall by less on line (2) than on line (1). Notice that hours worked fell slightly after the experimental period, because of the increase in lifetime income produced by the NIT. Line (3) assumes an inter-temporal substitution elasticity equal to 0.2. The inter-temporal substitution possibilities present on line (3) have two consequences. First, the income effects are larger than on line (2) and these will tend to reduce hours both during and after the experiment. Second, and more important, inter-temporal substitution between the experimental and later periods by itself causes hours worked to fall during the experimental period and to rise thereafter. Thus, in the illustration, hours worked fall by more on line (3) than on lines (1) and (2) during the experimental period, but rise slightly after the experiment. From the comparison of lines (2) and (3) with line (1) it appears to be unclear whether a short-duration NIT experiment will lead to under-rather than over-estimation of the disincentive effects of a permanent NIT scheme.

However, lines (1), (2) and (3) assume that workers freely can choose their hours of work at wage rates given by the market—that is, that employers are indifferent with respect to the hours of work of their employees. Thus, for example, on line (3) the husband, in response to the NIT, cuts his hours per week from 40.4 to 25.0 during the experiment and then raises his hours to 40.9 thereafter, presumably without having to change employers. It seems more reasonable to suppose that changes
in hours of work of this magnitude sometimes, perhaps often, would involve changing jobs with associated search costs and, for some, loss of "seniority" (specific human capital) benefits. (In this connection it would be useful to know what fraction of the male heads in the experiment were multiple job holders, their hours worked on the secondary job, and the impact of the NIT experiment on these hours.) It also seems likely that such costs typically will be greater for male heads with a more or less permanent, full-time attachment to the labor force than for the wives, who usually have less firm labor force attachments.

Lines (4) and (5) of the illustration assume that these job-change costs are sufficiently great for the husband in the context of the short-duration experiment that he avoids changing jobs, though he does cut his hours slightly during the experiment. (This assumption is consistent with the finding in the experiment that the experimental NIT did not lead to an increase in job turnover for male heads, though it does not explain reduced job turnover.) In other respects the model for lines (4) and (5) is the same as that for the preceding lines. In particular, it is still assumed that the wife freely chooses her hours.

The effect of the restraint on the husband's hours assumed in the illustration is to reduce both the lifetime income effects of the experiment, as can be seen by comparing line (2) with line (4) for the wife's hours, and especially the inter-temporal substitution effects, as shown by a similar comparison of line (3) with line (5).

In the illustration the wife cuts her hours during the experiment by less on lines (4) and (5) than on line (1). I don't mean to argue that this proves that the short duration of the experiment led to underestimation for married women of the disincentive effects of a similar,
but permanent NIT program, but only that the Final Report conceivably may not be correct in arguing the opposite. Of course, I have set the model up in such a way as to get the results on lines (4) and (5), but that does not make the results wrong.

As for the husbands, there is another reason for suspecting that the long-run disincentive effects may have been under-estimated, namely, that substitution possibilities within the household between time and market goods may be substantially larger in the long run than in the short run. Do-it-yourself that is neither thumb-twiddling to the doer or malingering to the observer requires planning and preparation.
References


