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WHAT IS LABOR SUPPLY AND DO
TAXES AFFECT IT?

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What is Labor Supply and Do Taxes Affect it?

ABSTRACT

There is a large econometric literature on the impact of income taxes on hours of work and labor force participation rates. It has long been understood, however, that the concept "labor supply" is more general than "hours of work." Individual differences in skills, motivation and health will influence the effective labor supply associated with any given number of hours of work. The purpose of this paper is to suggest some ways by which it might be possible to learn something about the effects of taxes on these other, and possibly very important, dimensions of labor supply.

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The issue of tax induced changes in labor supply behavior has been re-
ceiving increasing attention. Economic theory alone can say little about the
impact of income taxation on labor supply because of the well known conflict
between income and substitution effects. Therefore, an enormous amount of
effort has been devoted to empirical investigation of this problem, with a
focus on the impact of taxes on hours of work and labor force participation
rates. In Section I of this paper, we briefly discuss this literature and
its major conclusions.

It has been long understood, however, that the concept "labor supply"
is more general than "hours of work." If one individual is healthier, better
educated, and more highly motivated than another, then presumably a given
number of hours of work will lead to a greater effective labor supply for the
former than for the latter. Thus, studies of the effect of taxes on other
dimensions of labor supply are needed in order to assess the full impact of
taxes on work incentives. The main purpose of this paper is to discuss some
of this research (Section III) and to explore its policy implications
(Section IV).

I. Taxes and Hours of Work

Econometric studies of taxation and hours of work have increased
steadily in sophistication. In the pioneering econometric studies of the
determinants of hours of work, taxes were mostly ignored. Gross rather
than net wages were included in the list of regressors. (See, e.g., Cain,
or William Bowen and T. A. Finegan.) A major advance was due to Robert Hall,

who recognized that a progressive tax system fundamentally changes the shape of the budget constraint in income-leisure space (it is kinked, rather than a straight line), and therefore, standard econometric techniques must be modified. Subsequent work has dealt more explicitly with tax-induced non-linearities; the reader is referred to Gary Burtless and Jerry Hausman who discuss the problem in the context of the negative income tax.

The more econometrically advanced studies have tended to confirm the substantive results of their predecessors. Although there are inevitably considerable differences in parameter estimates due to differences in samples, time periods, and statistical techniques, I think it would be fair to say that two important "stylized facts" have been isolated:

1.   For prime age males, the substitution effect of changes in the net wage upon hours of work tends to be small in absolute value and often statistically insignificant. This result has emerged from both cross sectional studies (see, e.g.,Cain and Watts, 1973, or Burtless and Hausman, 1978) and from time series studies (see, e.g., Robert Lucas and Leonard Rapping.[1]

2.   The hours of work and labor force participation decisions of married women are quite sensitive to changes in the net wage. Although estimates differ widely, a number of investigators have found elasticities in excess of 1.0 (see Glen Cain and Harold Watts, Harvey Rosen, or Reuven Gronau).

One can imagine these results leading to some complacency on the part of individuals who conduct tax policy because of the implication that, except for secondary workers, increased taxation will not have much of an impact on hours of work decisions.[2] The discussion in the next section suggests that caution may, nevertheless, be appropriate.

II. Taxes and Other Dimensions of Labor Supply

The literature's emphasis on hours of work is easy to understand because it is an important variable and one that is relatively straight-forward to measure. Nevertheless, labor supply is a concept more general than number of hours per week or per year. In particular, at least three important dimensions of labor supply, other than hours, may be influenced by taxes: (a) lifetime hours of work and timing of retirement, (b) intensity of work effort, and (c) quality of work effort.

The theoretical and empirical evidence on these important issues is currently rather scanty. In this section, we discuss and evaluate some fragmentary evidence and suggest a few possibilities for future research.

A. Time of Retirement

Although income taxes[3] may not influence the number of hours worked per year, they may affect the number of years worked, i.e., the retirement decision. As Boskin (1977) has noted, until fairly recently it was widely believed that financial variables had little to do with retirement decisions. The pre-vailing opinion, based upon survey interviews, was that bad health was the overriding reason for retirement. In the past few years, however, a number of econometric studies of the determinants of the retirement decision have appeared (see Michael Boskin, 1977; Richard Burkhauser, Alan Blinder, et. al.) Almost uniformly, these studies suggest that the availability of pensions, the implicit tax imposed on wages by the social security system, and other financial considerations have statistically significant and quantitatively important impacts on the probability of retirement.

Most of these studies have focused on the interaction between pension and social insurance systems, on the one hand, and the retirement decision, on the other. Nevertheless, in some cases the results can be used to shed some light on the question of how the personal income tax influence retirement decisions, ceteris paribus. This is possible because the explanatory variables generally include potential market earnings, which depend upon the tax rate.

For example, Burkhauser analyzes the probability of males accepting social security retirement benefits at age 62 as a function of marital status, education, potential market earnings, and several other variables[4] His estimates suggest substantial responsiveness of retirement probability with respect to market earnings (p. 19). Consider, for example, an individual with adjusted gross income (in 1973) of $9700. Assuming that he pays a payroll tax of 6.05% and an average income tax of 9.0%,[5] his disposable income would be $8420. According to Burkhauser's figures, this $1460 change in net income would induce an increase in excess of 4 percentage points in the probability of retirement at age 62, a substantial difference.

This computation is meant to be only illustrative. Personal income taxes have not yet been integrated with sufficient care into models of the retirement decision to allow more definitive conclusions. However, in light of the apparent sensitivity of retirement decisions to economic variables, this is a subject worth further inquiry.

B.   Intensity of Work

"Hours of work" are usually measured as the amount of time elapsed at the workplace. However, because intensity of effort varies from

individual to individual, elapsed hours may be a poor proxy for the effective number of hours of work. Clearly, intensity of effort is difficult to measure, particularly in jobs where salaries are not based on piece rates. An interesting attack on this measurement problem has recently been made by Frank Stafford and Greg Duncan who analyze data from the Time Use Survey administered by the Survey Research Center of the University of Michigan. These data contain detailed time diaries in which individuals report on several measures of on-the-job time allocation: time spent in formal or scheduled work breaks; time spent informally socializing or any other type of unscheduled work breaks; and time spent in on-the-job training.

With this information, Stafford and Duncan can compute an estimate of effective number of hours, as well as hours of work as conventionally measured. In an interesting experiment, they estimate two labor supply equations for men, one using conventional hours as the dependent variable, and the second with effective hours. The right hand side variables include education and age. The coefficients on education and age in the second equation have larger (positive) signs and relatively smaller standard errors than their counterparts in the first (p. 34). To the extend that education and age are proxying for the wage, these results suggest that improper measurement of effective hours may be obscuring a positive wage response.

Because Stafford and Duncan do not explicitly include the after-tax wage in their effective hours equation, nothing more specific can be said at this time. But the use of time diaries seems a fruitful way to continue work on this problem.

C.   Human Capital Investments

It has been argued that one of the key sources of wealth in the United States and other developed countries is human capital, which augments the productivity of workers and, thereby, increases the effective size of the labor force. Despite intensive analysis of human capital decisions,[6] the relation of taxes to human capital investment has received little attention.

Theodore Schultz has argued that the United States tax system dis-criminates against human capital investment:

Our tax laws everywhere discriminate against human capital. Although the stock of such capital has become large and even though it is obvious that human capital, like other forms of reproducible capital, depreciates, becomes obsolete, and entails maintenance, our tax laws are all but blind on these matters [p. 13].

This view has been challenged by Boskin (1975), who points out that Schultz's argument regarding the lack of deductibility for expenditures on human capital investment is erroneous once it is recognized that the most important costs of human capital are foregone earnings, rather than tuition payments. It has been estimated that foregone earnings amount to over half the costs of human capital (Boskin, 1975, p. 5).

Boskin points out that if all the costs of human capital investment are foregone earnings,then in a simple model a proportional wage tax has no impact whatsoever on the decision to invest in human capital. The logic of this argument is straightforward. The tax reduces the benefits and costs in the same proportion, so if the net present value was positive prior to the tax, it remains positive after the tax is imposed.

However, Jonathan Eaton and Harvey Rosen have shown that even under the assumption that the only costs of human capital accumulation are foregone earnings, the neutrality result does not necessarily follow. There are two reasons for this. First, an important assumption in the simple model is that the supply of hours of work is fixed regardless of the net wage. Now, hours of work can be thought of as the "utilization rate" of human capital: the more the individual works, the higher is the rate of utilization and, therefore, the higher the return on the human capital investment. With an endogenous hours of work decision, then, a wage tax may change the benefits of the investment without an offsetting movement in the costs, and neutrality no longer holds.

A second factor ignored in the simple model is the uncertainty of returns to human capital. When an individual makes an educational investment, he or she does not know for certain that it will increase earnings capacity, or by how much.[7] It can be shown that even when hours of work are independent of the net wage, if the returns to human capital are stochastic, then proportional wage taxation will not in general be neutral in the human capital decision (Eaton and Rosen). Rather, the impact of taxation is ambiguous because of two conflicting effects: (i) A proportional wage tax cuts the riskiness of human capital because, in effect, the Treasury serves as the taxpayer's silent partner, sharing in both gains and losses.[8] To the extent that the individual is risk averse, this insurance effect tends to increase human capital accumulation. (ii) On the other hand, the proportional tax reduces the individual's wealth. To the extent that the desire to invest in relatively risky assets decrease with wealth, then this effect will tend to decrease investment in human capital.

Because the two effects work in opposite directions, in the absence of specific assumptions on how risk aversion varies with wealth, it is impossible to know a priori how a proportional wage tax will change human capital accumulation. Just as in the hours of work case, only empirical work can settle the question. However, measurement problems make econometric analysis here even harder than in the hours of work case. How does one measure the amount of capital embodied in a human being? What proportion of educational expenditures are consumption and what proportion investment? How can one estimate the amount of earnings foregone in on-the-job and vocational training programs?

In light of these formidable problems, it is no wonder that little empirical work has been done. However, a recent paper by Robert Willis and Sherwin Rosen permits us at least to speculate on the impact of taxes on an important kind of human capital investment, college attendance.

The Willis-Rosen (W-R) study measures the influence of various factors on the probability that an individual attends college. They investigate a number of "background" variables, such as religion, achievement test scores, and father's occupation. In addition, they find that the probability is significantly affected by the expected growth rates of earnings, with and without college, and by the ratio of the initial earnings obtained by college graduates to the earnings of those who did not attend.

Some of their results are reported in Table 1. The variable g_c is the expected growth rate of earnings if the individual goes to college, g_{nc} is the rate without college, and y_c^i/y_{nc}^i is the ratio of college to non-college earnings in the initial period (the elasticities are evaluated at a sample proportion of one-half). These figures suggest that returns to college exert a substantial impact upon the decision to attend.

TABLE 1

Elasticities of the Probability of College Attendance with Respect to:

g_c	g_{nc}	y^i_c / y^i_{nc}
2.91	-0.61	4.1

Source: Based upon estimates in Willis-Rosen and included in a

personal communication from Robert Willis.

An interesting exercise is to compute the percentage changes in g_c, g_{nc}, and y_c^i/y_{nc}^i generated by the federal income tax, and use the elasticities in Table 1 to find the implied change in the probability of enrolling in college. More specifically, for pre-tax values of the variables, I use the means reported by W-R (p. 41) and post-tax magnitudes are calculated by applying federal tax tables to the pre-tax values.[9] Due to progressivity, the income tax lowers g_c by 10.1%, g_{nc} by 12.2%, and y_c^i/y_{nc}^i by 4.6%. Taking these results together with the elasticities in Table 1 yields a decrease of 3.5 percentage points in the probability of enrolling in college. Because the elasticities of Table 1 are at the low end (in absolute value) of those reported by W-R, this figure should be regarded as a conservative one.

As W-R emphasize, their results cannot be extrapolated to the population as a whole because the sample used to generate the parameter estimates is highly non-representative. (It consists of a group of male World War II veterans who applied for the army air corps.) However, the estimates suggest that enough of an effect may be present to make further empirical investigation of this problem worthwhile.

III. Conclusions

There is a rich and extensive literature on the impact of taxation upon hours of work. Doubtless, econometric work to refine current estimates will continue. But "labor supply" and "hours of work" are not the same, and it is the former concept that should be of concern to those who are interested in the long-run exonomic effects of taxation. As noted above, this fact has long been realized, but I think that an implicit view in much of the public finance literature is that it is simply too hard to find out anything useful about the effect of taxes on other dimensions of labor supply. I

have tried to show that there exists research which can be built upon to learn about this subject, and even some hints that the tax effects are important.

At this point, all that can be said to the makers of tax policy is that they should proceed with caution when it comes to taxing labor. As evidence accumulates that the income tax and social insurance systems influence appreciably the stock of physical capital (e.g., Martin Feldstein), there may be a temptation to increase relative tax rates on labor because hours of work appear to be inelastic in supply. Because hours of work are just the tip of an iceberg that is potentially very deep, this may be a misguided policy.

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FOOTNOTES

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[1] An implication of this research is that in the short run, at least, it is unlikely that reductions in labor's tax burden will unleash an enormous amount of work effort.

[2] Of course, due to income effects, there can be a substantial excess burden of taxation, even if the uncompensated labor supply elasticity is small.

[3] In this paper I consider only taxes defined in the narrow sense, and not benefit reductions in transfer programs.

[4] Burkhauser's data were from the 1973 Social Security Exact Match File.

[5] This figure is for a married person with no dependents. See Tax Foundation Inc, p. 105.

[6] See, for example, Schultz or Gary Becker.

[7] It is unlikely that the individual can insure himself against such risks because the problems of moral hazard associated with insurance in general are especially pervasive in the case of human capital. In such a situation, the market is unlikely to provide insurance.

[8] Similar arguments have been used in discussion of the impact of taxation on nonhuman investment. See, for example, Joseph Stiglitz.

[9] For purposes of computing tax liability, it is assumed that the individual is married, files jointly, and has two dependents.