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THE RETURN TO TAX SIMPLIFICATION: AN ECONOMETRIC ANALYSIS

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ABSTRACT

The purpose of this paper is to provide estimates of the probable saving in the resource cost of complying with the tax law that would result from simplifying the individual income tax law. These estimates are based on an econometric analysis of the tax filing behavior in 1982 of a sample of Minnesota taxpayers.

A simple model of tax compliance behavior based on utility maximization is first presented in order to suggest the important determinants of compliance behavior. The empirical model treats the discrete choices of whether to itemize deductions and whether to hire professional tax advice, and the choice of how much time and money to spend, conditional on the discrete choices made.

Simulations based on the econometric results suggest that significant resource saving could be expected from eliminating the system of itemized deductions, although no significant saving from changing to a single-rate tax structure can be confidently predicted.

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1. Introduction

Students of tax complexity and simplification have, in their writings, highlighted the many dimensions of this subject. An important issue to the tax lawyer is the certainty, or predictability, of the tax law. To the tax collection agency, complexity in large part relates to the administrative cost of raising revenue, and in particular to the encouragement that some tax provisions provide for the use of complicated tax devices designed to avoid tax payments. For the taxpayer himself, a critical aspect of complexity is the time and expense involved in completing the tax return, including not only complying with the filing requirement, but also identifying and documenting the deductions, credits, and reductions in taxable income to which he is entitled.

The disadvantages of complexity in the tax system are suggested by these various aspects of the concept. Unpredictability and the existence of complicated ways to avoid taxes may erode confidence in the fairness of the tax system and thereby affect voluntary compliance.[1] It may also subsidize those taxpayers who are not averse to interpreting the tax law to their advantage (legally or illegally), an aspect which to many has an unacceptable distributional implication. The process of income tax collection under the current system also involves substantial resource costs. A recent study (Slemrod and Sorum (1984)) estimated the resource cost of income tax filing borne directly by taxpayers in the United States to be on the order of five to seven percent of revenue collected. A conservative estimate of total collection costs, which includes the resources used by the collection agencies and third parties (primarily employers which participate in the withholding system), is seven to eight percent of total revenue, or about $30 billion annually.

Clearly, complexity in a tax system has substantial resource costs and arguably adverse distributional consequences. This does not, though, imply that the best tax system is necessarily the simplest one. As Surrey (1969) and others have argued, a certain amount of complexity is the inevitable result of the intent to maintain standards of horizontal and vertical equity in an exceedingly complex economic environment. In addition, the present income tax system is the vehicle for the subsidization of a vast array of behavior such as charitable giving, installing energy saving equipment, and homeownership.[2] Any argument to eliminate these tax expenditure aspects on the grounds of simplification must come to terms with the reasons, if any, for the subsidization. If subsidization through the tax system is replaced by a more direct subsidy program, then the operation of the government as a whole has been simplified only if the direct method is more cost-efficient than the tax expenditure method.

An analysis of any tax simplification proposal ought to consider its advantages, including the savings in the resource cost of compliance, along with the distributional and efficiency implications of the proposal. Brannon (1979) and Slemrod (1983) have argued that, in principle at least, the resource costs (called "complication costs" by Brannon) can be quantified and considered with the more standard equity and efficiency effects. The principle obstacle to implementing this framework for analysis has been the dearth of quantitative information about the resource cost implications of simplification plans. Although recent work has provided useful estimates of the total resource cost of the current income tax system, what is more important for policy purposes is the expected change in the resource cost due to a proposed tax reform. This is the valuable input for the purpose of analysis, not the current level of resource costs.

The purpose of this paper is to provide estimates of the probable resource cost savings from some currently popular tax law simplification plans. These estimates are based on an econometric analysis of the tax filing behavior in 1982 of a sample of Minnesota taxpayers. The study does not consider the likely impact on the administrative or third-party costs of the simplification plans, nor its distributional or standard efficiency effects, so it comprises only one part of a complete analysis of any of the proposed reforms.

The remainder of the paper is arranged as follows. In Section 2, a simple theoretical model of tax compliance behavior based on utility maximization is presented. The model is used to suggest the important determinants of compliance behavior to be considered in an empirical study, and what the likely direction of influence is. Section 3 develops an empirical model that treats the discrete choices of whether to itemize deductions and whether to hire professional tax advice, and the choice of how much time and money to spend, conditional on the discrete choices made. Section 4 describes the data for the analysis. In Section 5, the results of the econometric analyses are presented and discussed. Section 6 utilizes these estimates to simulate the likely impact of two proposed tax simplification plans, and Section 7 offers some concluding comments.

2. A Simple Theoretical Model of Compliance Behavior

The goal of this section is to construct a simple model of the taxpaying household's choices concerning its tax filing behavior. The household must choose how much of its own time to spend on tax matters and how much, if any, professional tax advice to purchase.[3] It is assumed that both of these activities uncover legitimate ways to reduce taxable income, and thereby reduce tax liability. The model thus abstracts from the use of illegal reductions in or deductions from taxable income. This assumption allows the consumer problem to be posed as one of complete certainty.[4] The decision problem for a representative household can be stated as

(1a) $$\underset{I,\, C,\, L,\, H,\, B}{\text{Maximize}} \quad U(C,\ L+\gamma H)$$

subject to

(1b) $$C = A + wL - T(A + wL - E - R - (1-I)S - I(D + P_B B)) - P_B B$$

where the notation is defined as follows:

A : non-labor income
B : hours of professional tax assistance purchased
C : consumption of composite good
D : deductions from taxable income (not including payments for professional tax assistance)
E : exemptions
H : hours of own time spent on preparing tax return
I : dummy variable equal to one for households that itemize deductions and equal to zero otherwise
P_B: price per hour of professional tax assistance
R : reductions in taxable income
S : standard deduction
T : tax function
w : wage rate
γ : labor-equivalent of one hour spent on tax compliance

According to (1a), utility is a function of consumption of a composite good, labor supply, and hours spent on tax matters. Equation (1b) states that consumption equals gross income, which consists of exogenously given non-labor income and labor income, minus taxes paid and payments for professional tax assistance. Taxable income is gross income minus exemptions, which require no effort to uncover, reductions intaxable income, and deductions from taxable income, which equal $(1-I)S + I(D+P_BB)$. Note that if the household chooses not to itemize deductions $(I=0)$, allowable deductions are simply the standard deduction amount. When the household itemizes deductions $(I=1)$, it can deduct $D+P_BB$ from taxable income.

Consider a compliance technology which embodies the relationship between the tax liability claimed and the inputs to the processes. We represent this technology by the R and D functions as follows

(2a) $R = (H,B,\bar{G},\bar{N},\Omega)$

(2b) $D = (H,B,\bar{G},\bar{N},\Omega)$.

They state that both the amount of reductions in taxable income and the amount of deductions from taxable income depend on the amount of own time spent on uncovering either, the amount of professional assistance purchased, the type of tax return the household files (indexed by $\bar{G}$), some personal characteristics (indexed by $\bar{N}$) such as age, level of education completed, and attitude toward tax matters, and the tax law itself (Ω). Time and money spent on uncovering and documenting deductions are treated distinctly from resources spent on finding reductions in taxable income because the former activities are worthwhile only if the household chooses to itemize deductions, while the latter may be worthwhile to any household whch has a nonzero marignal tax rate. This distinction will be important later when we consider the impact of eliminating the itemization option. Note that the deductions and reductions functions are general enough to allow for the possibility that time and money devoted to one pursuit may have an indirect effect on the other.

One crucial assumption implicit in this formulation is that the elements of the $\bar{G}$ vector are not subject to household choice. The impact of this assumption is that the compliance technology and tax code do not affect the type of income earned (employed versus self-employed, income from real estate, partnerships, for example) nor do they affect the activities that cause potential deductions, such as purchasing medical services, making charitable contributions, borrowing money, and so on.

The household is faced with a joint decision problem. It must make a discrete choice between itemizing deductions or not. Conditional on that choice, it must decide how much labor to supply and how much to expend on compliance, including its own time and payments for professional tax preparers.

The household will choose whichever itemization status yields the higher level of utility. Without considering compliance costs this decision involves a comparison of S and $D+P_BB$, where $D+P_BB$ is to be interpreted as the amount of available deductions. If $D+P_BB$ exceeds the standard deduction, S, then the household would itemize deductions. However, in the presence of compliance costs the choice is more complicated because it is no longer costless to uncover and document the deductions. The preferred choice will depend on the household's utility function, its endowment (including the level of tax exemptions), and its individual and tax return characteristics which affect the compliance technologies.

The first-order conditions of the Kuhn-Tucker optimization problem for the conditional choice of H, B, assuming that the choice of L is interior, are

(3a) $t(R_H+ID_H) - \gamma w(1-t) \leq 0 \quad = 0 \text{ if } H > 0$

(3b) $t(R_B+ID_B) - (1-It)P_B \leq 0 \quad = 0 \text{ if } B > 0$

where t stands for the marginal tax rate and first partial derivatives are denoted in the usual way. Note that the value of I enters the first-order conditions in two separate ways. First, the marginal benefit of uncovering deductions can be positive only if I is one. In addition, the after-tax cost of professional tax advice depends on the itemization decision because these expenses are deductible from taxable income.

Differentiation of (3a)-(3b) allows us to investigate the effect on compliance behavior of changes in the marginal tax rate, the net wage rate, and the itemization status when both H and B are positive. Unfortunately, even in this simple model, few unambiguous statements can be made about the sign of these relationships. It is, though, worthwhile to briefly look at the implications of the theoretical model. The detailed calculations are presented in an appendix to this paper.

An increase in the marginal tax rate directly increases the payoff from reducing taxable income by a dollar. For itemizers, it also decreases the cost of professional tax assistance. The theory implies that both H and B will necessarily increase only if H and B are complementary inputs in both compliance technologies. Otherwise it is conceivable that an increase in t will induce a change in technique so that either H or B , but not both, will increase.

An increase in the after-tax wage rate, holding t constant, increases the opportunity cost of own time spent on tax matters. This leads to an unambiguous decline in H , but the effect on B is not determinate. For non-itemizers, B will decline if it is complementary with H in the taxable income reduction technology, and increase otherwise. For itemizers, the response of B depends on its complementarity with H in both the "deduction" and "reduction" technologies.

Itemization status is not a continuous variable and thus its impact is not as accessible using the calculus. However, inspection of the partial effect of a small increase in I is revealing. The effect is similar to that of an increase in the marginal tax rate. First of all, the payoff to uncovering deductions (but not reductions) from taxable income increases in proportion to the marignal tax rate. Second, the cost of professional tax assistance declines, again in proportion to the marginal tax rate. The impact of a change in I on H and B depends, as in the case of the marginal tax rate, on whether H and B are complementary inputs. If they are, then an increase in I will increase both H and B . If they are not, it is conceivable that either H or B , but not both, could decline.

As we will see later, for many observations, B equals zero and (3b) does not hold as an equality. In this case differentiation of (3a) alone reveals that, as long as own time spent is subject to locally diminishing returns, an increase in the marginal tax rate will increase H, an increase in $w(1-t)$ will decrease H, and a small increase in I will cause H to increase.

3. Estimation Strategy

For each household in the sample, we observe whether deductions were itemized (I), H, B, and the values of several exogenous variables which, we hypothesize, affect tax compliance behavior either by entering the tax compliance technology or affecting tastes for tax related work. We observe that, although virtually no households report that zero time was spent filing tax returns, a significant fraction report no expenditures on tax assistance. Our goal is to use these data to estimate the determinants of tax filing behavior, including the discrete choices of whether to itemize deductions and whether to purchase tax advice, and the determinants of the expenditure of time and money, conditional on the outcome of the two discrete choices.

We consider two distinct estimation approaches. The first approach is to estimate reduced form equations for H and B using ordinary least-squares. We include all exogenous variables as regressors plus a dummy variable for itemization status, and, in a alternative version, also an interactive dummy variable. This model has the advantage of transparency and direct interpretability. At the same time, it ignores the statistical problems that arise because of the endogeneity of the itemization decision and the existence of a significant fraction of households that do not hire any professional tax assistance. This first problem is especially significant because one of the goals of this research is to investigate the effect of eliminating the option of itemizing deductions.

The second estimation approach is decidedly more ambitious. We proceed by constructing a general linear model that can accomodate all of the important aspects of the theoretical model and data structure. The model has three parts.

In the first part, we introduce an unobservable variable I^*, which is a measure (of arbitrary scale) of the difference between the maximum utility attainable in the event the taxpayer itemizes deductions and the maximum utility attainable if deductions are not itemized; that is,

$$(4) \quad I_i^* = k[V_i(I_i=1) - V_i(I_i=0)] ,$$

where k is an arbitrary constant. We posit that I_i^* is a linear function of the exogenous variables of the system, Z_i, and append an additive error term, ε_i, which encompasses both optimization error and unobservable variables which affect I_i^*, such as intelligence and unknown characteristics of the taxpayer's tax situation, so that

$$(5) \quad I_i^* = \gamma' Z_i + \varepsilon_i$$

$$I_i = 1 \text{ iff } I_i^* > 0$$

$$I_i = 0 \text{ iff } I_i^* \leq 0.$$

We make the standard assumption that ε_i is distributed as a standard normal variable. Equation (5) indicates that, although I_i^* is unobserved, the itemization decision is observed, so that we know whether I_i^* is positive or not.

The second part of the system models the decision of whether to purchase professional tax advice, conditional on the itemization status chosen. As with the itemization decision, it is posited that there is a latent variable (called either J^*_{Ii} or J^*_{Ni} for itemizers and non-itemizers, respectively) which represents the propensity to pay for professional advice (or, more formally, the difference between attainable utility if advice is contracted for and attainable utility if it is not hired). The unobserved variable is presumed to be a linear function of the exogenous variables of the system, and also contains an error term which encompasses both optimization error and the influence of unobservable variables.

(6a) $J^*_{Ii} = \delta_I' Z_i + \nu_{Ii}$ $\quad\quad \nu_{Ii} \sim N(0,1)$

$J_{Ii} = 1 \text{ if } J^*_{Ii} > 0$

$J_{Ii} = 0 \text{ if } J^*_{Ii} \leq 0$

(6b) $J^*_{Ni} = \delta_N' Z_i + \nu_{Ni}$ $\quad\quad \nu_{Ni} \sim N(0,1)$

$J_{Ni} = 1 \text{ if } J^*_{Ni} > 0$

$J_{Ni} = 0 \text{ if } J^*_{Ni} \leq 0$

The error terms ε_i , ν_{Ii} , and ν_{Ni} will, in general, be correlated.

The third part of the system models the choice of H and B , conditional on the outcome of the two discrete choices. A linear representation of the first-order conditions (3a) and (3b) is

Itemizing Regime ($I_i = 1$)

(7a) $H_i = \alpha_{I0} B_i + \alpha'_{I1} X_{Hi} + u_{HIi}$

(7b) $B_i = \beta_{I0} H_i + \beta'_{I1} X_{Bi} + u_{BIi}$

Not Itemizing Regime ($I_i = 0$)

(7c) $H_i = \alpha_{N0} B_i + \alpha'_{N1} X_{Hi} + u_{HNi}$

(7d) $B_i = \beta_{N0} H_i + \beta'_{N1} X_{Bi} + u_{BNi}$

Here X_H and X_B refer to the vectors of exogenous variables in the H and B equations, respectively. The error terms in equations (7a)-(7d) may be correlated with the error terms in (5), (6a), and (6b). Note that when J_{Ii} is zero (no professional assistance hired), (7b) is irrelevant and (7a) collapses to

$$(7a') \quad H_i = \alpha'_{I1} X_{Hi} + u_{HIi} .$$

Similarly, when J_{Ni} is zero, (7d) is irrelevant and (7c) reduces to

$$(7c') \quad H_i = \alpha'_{N1} X_{Hi} + u_{HNi} .$$

It is worth noting that the system outlined here is more general than a "Tobit" type system in which one structural equation determines both the probability that a household pays for professional assistance and the amount spent, conditional on spending any positive amount. In this more general structure, the two decisions are allowed to respond differently to exogenous variables. This differentiation is appropriate if, for example, there are fixed costs involved in purchasing professional tax advice. The existence of fixed costs is in fact reasonable, as the preparer must become familiar with the return before the return can be completed. For complicated and idiosyncratic returns with large fixed costs associated with preparation, it is plausible that a taxpayer may be unlikely to hire professional advice but, if any assistance is purchased, a substantial amount will be required.

It is well known that direct estimation of (7a)-(7d) by ordinary least squares will yield biased coefficient estimates because the expected value of the error term, conditional on the household being observed in a particular itemization and professional assistance regime, is generally nonzero and correlated with the explanatory variables. Our strategy in this event is to utilize a two-stage estimation procedure. The first stage is to estimate the bivariate discrete choice model outlined above of whether to itemize deductions and whether to hire professional tax assistance, conditional on the itemization decision. In the second stage, the estimates of the discrete choice model are utilized to control for the self-selection biases in the estimation of the simultaneous system of (7a)-(7d).

The first stage of the estimation begins with our stated assumptions that both ε_i and ν_{Ii} and also ε_i and ν_{Ni} have a joint normal distribution, and that each term has unit variance. Next we divide the observations into four regimes as follows:

(8)	R_1 :	$I_i^* > 0$, $J_{Ii}^* > 0$	(itemize, hire assistance)
	R_2 :	$I_i^* > 0$, $J_{Ii}^* \leq 0$	(itemize, don't hire assistance)
	R_3 :	$I_i^* \leq 0$, $J_{Ni}^* > 0$	(don't itemize, hire assistance)
	R_4 :	$I_i^* \leq 0$, $J_{Ni}^* \leq 0$	(don't itemize, don't hire assistance)

If we denote the bivariate distribution function of ε and ν_I as $f_I(\cdot, \cdot, \rho_I)$ and the joint density of ε and ν_N as $f_N(\cdot, \cdot, \rho_N)$, the likelihood function is

$$(9) \quad \prod_1 \int_{-\delta_I' Z_i}^{\infty} \int_{-\gamma' Z_i}^{\infty} f_I(\varepsilon, \nu_I, \rho_I) d\varepsilon_i du_{Ii} \prod_2 \int_{-\infty}^{-\delta_I' Z_i} \int_{-\gamma' Z_i}^{\infty} f_I(\varepsilon, \nu_I, \rho_I) d\varepsilon_i du_{Ii}$$

$$\prod_3 \int_{-\delta_N' Z_i}^{\infty} \int_{\infty}^{-\gamma' Z_i} f_N(\varepsilon, \nu_N, \rho_N) d\varepsilon_I du_{Ni} \prod_4 \int_{-\infty}^{-\delta_N' Z_i} \int_{-\infty}^{-\gamma' Z_i} f_N(\varepsilon, \nu_N, \rho_N) d\varepsilon_i du_{Ni}.$$

We employ the method of maximum likelihood to estimate the parameters γ', δ_I',

δ_N', ρ_I, and ρ_N.

As mentioned above, the results of the first-stage estimation are to be used in the estimation of the parameters of (7a)-(7d). To see how this works, we first write the reduced forms of these equations as

Regime 1 $(I_i = 1, J_{Ii} = 1)$

(10a) $H_i = k[(\alpha_{I1}' + \alpha_{I0}\beta_{I1}')X_i + u_{HIi}^o]$

(10b) $B_i = k[\beta_{I1}' + \beta_{I0}\alpha_{I1}')X_i + u_{BIi}^o]$

Regime 2 $(I_i = 1, J_{Ii} = 0)$

(10c) $H_i = \alpha_{I1}'X_i + u_{HIi}$

Regime 3 $(I_i = 0, J_{Ni} = 1)$

(10d) $H_i = k[(\alpha_{N1}' + \alpha_{N0}\beta_{N1}')X_i + u_{HNi}^o]$

(10e) $B_i = k[\beta_{N1}' + \beta_{N0}\alpha_{N1}')X_i + u_{BNi}^o]$

Regime 4 $(I_i = 0, J_{Ni} = 0)$

(10f) $H_i = \alpha_{N1}'X_i + u_{HNi}$

where $\quad k = 1/(1-\alpha_{IO}\beta_{IO})$,

$$\overset{o}{u}_{HIi} = u_{HIi} + \alpha_{IO}u_{BIi} \ ,$$

$$\overset{o}{u}_{BIi} = u_{BIi} + \beta_{IO}u_{HIi} \ ,$$

$$\overset{o}{u}_{HNi} = u_{HNi} + \alpha_{NO}u_{BNi} \ ,$$

$$\overset{o}{u}_{BNi} = u_{BNi} + \beta_{NO}u_{HNi} \ ,$$

and X_i is now the set of all exogenous variables in (7a)-(7d), and the vectors α_{I1}' and β_{I1}' are expanded to be compatible with X_i.

The problem with estimating (10a)-(10f) by ordinary least squares is that the error terms are not necessarily uncorrelated with the explanatory variables, given the self-selection rules. For example,

$$\text{(11)} \qquad E(H_i \mid I_i = 1,\ J_{Ii} = 1) \neq k(\alpha_{I1}' + \alpha_{IO}\beta_{I1}')X_i$$

but, rather,

$$\text{(12)} \qquad E(H_i \mid I_i = 1,\ J_{Ii} = 1) = k(\alpha_{I1}' + \alpha_{IO}\beta_{I1}')X_i + kE(\overset{o}{u}_{HIi} \mid I_i = 1,\ J_{Ii} = 1)$$

Fortunately, the estimates obtained from the bivariate probit model allow us to form a consistent estimator of $E(\overset{o}{u}_{HIi} \mid I_i = 1,\ J_{Ii} = 1)$ and of the other error terms in (10b)-(10f), conditional on regime. For example, it can be shown that

$$\text{(13)} \quad E(\overset{o}{u}_{HIi} \mid I_i = 1,\ J_{Ii} = 1) =$$

$$\Bigg\{ \rho_{\varepsilon u} \left[\frac{f(\hat{\gamma}'Z_i)}{F(\hat{\gamma}'Z_i, \hat{\delta}_I Z_i, \hat{\rho}_I)} \quad F\left(\frac{\hat{\delta}_I' Z_i - \hat{\rho}_I \hat{\gamma}' Z_i}{(1-\hat{\rho}_I^2)^{1/2}} \right) + \hat{\rho}_I f(\hat{\delta}_I' Z_i) f\left(\frac{\hat{\gamma}' Z_i - \hat{\rho}_I \hat{\delta}_I' Z_i}{(1-\hat{\rho}_I^2)^{1/2}} \right) \right.$$

$$\left. + \ \rho_{\nu u} \left[\frac{f(\hat{\delta}_I' Z_i)}{F(\hat{\gamma}' Z_i, \hat{\delta}_I Z_i, \hat{\rho}_I)} \quad F\left(\frac{\hat{\gamma}' Z_i - \hat{\rho} \hat{\delta}_I Z_i}{(1-\hat{\rho}_I^2)^{1/2}} \right) + \hat{\rho}_I f(\hat{\gamma}' Z_i) F\left(\frac{\hat{\delta}_I' Z_i - \hat{\rho}_I \hat{\gamma} Z_i}{(1-\hat{\rho}_I^2)^{1/2}} \right) \right] \right\}$$

where $\rho_{\varepsilon u} = \text{corr}(\varepsilon_i, u^o_{HIi})$, and $\rho_{\nu u} = \text{corr}(\nu_{Ii}, u^o_{HIi})$. In (13), σ^o_{HI} is the standard deviation of u^o_{HIi}, and f and F refer to the density and cumulative density functions, respectively, of standard normal distributions. When there is one argument in the cumulative density function, it refers to a univariate distribution, and when there are three arguments, it refers to a bivariate distribution. Similar expressions analogous to (13) that correspond to the expected value of the error terms in equations (10b)-(10f) can be derived. Note that the terms in the square brackets are $E(\varepsilon_i \mid I_i = 1, J_{Ii} = 1)$ and $E(\nu_{Ii} \mid I_i = 1, J_{Ii} = 1)$, respectively.

The bivariate probit estimation procedure provides consistent estimates of γ', δ_I', δ_N', ρ_I, and ρ_N. Thus, in order to estimate the parameters of (10a), for example, an ordinary least-squares procedure for the observations in regime 1 would include as explanatory variables not only the union of X_H and X_B, but in addition would include the two terms in square brackets. Lee, Maddala, and Trost (1980) have shown, in a similar model, that the estimates of the parameters of (10a) so obtained are consistent, though the estimated standard errors from the ordinary least-squares equations will underestimate the true standard errors, as their calculation ignores the fact that $\hat{\gamma}'$, $\hat{\delta}_I$, and $\hat{\rho}_I$ are themselves estimated.[5]

4. Data

The data for this study are drawn from a mail survey of Minnesota households' tax filing behavior. Immediately after the deadline for filing 1982 tax returns (April 15, 1983), a four-page questionnaire was mailed to a random sample of 2,000 Minnesota residents. The response rate of the survey was 32.65 percent. Of the 653 questionnaires returned, 41 were from people not required to file 1982 state or federal tax returns. Thirty-eight questionniares were eliminated from the sample because of incompleteness, leaving a total of 574 usable responses. A detailed description of the data and survey procedures is presented in Slemrod and Sorum (1984).

The questionnaire's first section asks for some demographic information, in particular the respondent's sex, age, level of education completed, income, employment status, occupation, and wage rate or reservation wage. In assessing this information, it is important to realize that the cover letter pointedly asks that the addressee refer the questionnaire to the "person in [the] household most familiar with filing [the] income tax returns." Thus the distribution of demographic characteristics should not be expected to precisely replicate the population distribution of characteristics. In particular, answers to questions about sex and education would be expected to be biased if, as the data indicate, males tend to be more familiar with the returns or, as is likely, the more educated household member is more familiar with the filing process.

The next section of the questionnaire solicits information about the household's income tax return itself. The taxpayer is asked which, if any, of the three federal tax returns and which, if either, of the two Minnesota state tax forms was filed. In addition, responses are sought concerning whether the return featured itemized deductions, whether it was a joint return, and which of several sources of income were received.

The remainder of the questionnaire is devoted to collecting information about the household's cost of filing tax returns. This section asks how many hours were spent during the year, and a breakdown of the hours into various categories. In addition, any money spent on tax assistance or otherwise spent in filing returns is solicited. A question on the individual's attitude toward filing returns is included, as is a question designed to elicit a dollar figure for hte value of all time, effort, and money spent on tax affairs. Finally, the taxpayer was asked whether he or she had ever chosen not to undertake some business activity because of the hassle or expense of complying with tax laws.

A subset of the information collected in the survey is used in this study. The precise definition of the variables considered is as follows:

Endogenous Variables

H: total hours spent on tax matters

B: total dollar expenditure on professional tax assistance

Exogenous Variables

AGE: age of respondent

AGESQ: age squared

EDU: years of education completed

MAR: dummy variable equal to one if respondent is married; equal to zero otherwise

EASY: dummy variable equal to one if tax return did not contain any dividends, interest, self-employed business income, capital gains, rental income, pension, annuity, or other income; equal to zero otherwise

INT: dummy variable for presence of interest income

DIV: dummy variable for presence of dividend income

SEBUS: " " " " " self-employed business income

CAPGL: " " " " " capital gains or losses

RENT: " " " " " rental income

PENANN: " " " " " pension or annuity income

OTHER: " " " " " "other" income

TIMEVAL: value of time (per hour), measured as after-tax wage rate or reservation wage

TAX: marginal tax rate applicable to deductible expenses, expresed as a fraction

The interpretation of most of these variables is clear; some, though, merit further comment. Responses to the age and education question were in ranges. Each taxpayer was assigned the midpoint of the indicated range. Those indicating "over 65" were assigned an age of 70 and those indicating graduate-level education were assigned eighteen years. The marginal tax rate was calculated from information about income reported by the taxpayer. The calculation takes into account both the federal and state income tax and the possible deductibility of one tax in the calculation of taxable income for the other level of government. Because a usable wage rate was not supplied on 46 percent of the returned questionnaires, a wage equation was estimated for those who did supply a usable answer and used to impute a wage rate for those who did not.[6] The exogenous variables in this equation were the income level, employment status, occupation, age, level of education completed, marital status, and sex. The marginal tax rate applied to the gross wage is the same as that described above plus the social security tax.

All of the exogenous variables listed above are included in the vectors

Z and H. The vector B includes all of the above except TIMEVAL.

5. Results

The results of the ordinary least-squares estimations are presented in Table 1. Two separate reduced-form equations were estimated for both own time spent and for professional assistance purchased. One version (denoted A) includes all the exogenous variables plus a dummy variable for itemization status (ITEM). The second version (denoted B) includes all these variables plus an interactive dummy term which is equal to the product of TAX and ITEM, called TAXITEM This particular interactive term is included because of the fact that, for itemizers only, the tax rate affects not only the return to reducing taxable income be one dollar but also directly affects the effective price of professional assistance.

The results shown in Table 1 indicate that age has a U-shaped relationship with both time and money spent, reaching its minimum point at the age of thirty-five for time spent and thirty-two for money spent. Thus for most of the range of ages, compliance cost increases with age. More educated taxpayers tend, *ceteris paribus*, to spend more of their own time on tax matters and less money for assistance. This finding is consistent with the hypothesis that more educated taxpayers are also more productive at tax matters than less educated taxpayers. The same pattern applies to married households: they spend more time and less money than households not headed by a married couple. For the most part, the results indicate that households with more complicated returns (as measured by the presence of various sources of income) spend more time and money on tax matters.[7] Particularly strong associations exist between

Table 1

Parameter Estimates: Ordinary Least Squares Using All Observations

Independent Variable	Hours A	Hours B	Professional Assistance A	Professional Assistance B
Constant	1.15 (19.96)	-3.36 (23.17)	1.93 (36.58)	62.86 (42.17)
AGE	-0.52 (0.85)	-0.53 (0.86)	-1.93 (1.56)	-1.83 (1.56)
AGESQ	0.0074 (0.0094)	0.0076 (0.0094)	0.030* (0.017)	0.029* (0.017)
EDU	0.89 (0.66)	0.91 (0.66)	-0.68 (1.21)	-0.86 (1.20)
MAR	6.96* (4.44)	7.02* (4.44)	-11.67 (8.13)	-12.42* (8.08)
EASY	-9.60 (7.90)	-9.47 (7.92)	-18.63 (14.49)	-20.37 (14.41)
INT	-3.75 (6.36)	-3.61 (6.38)	-22.26* (11.66)	-24.06** (11.61)
DIV	-6.13 (4.42)	-6.05 (4.43)	-5.00 (8.11)	-6.11 (8.07)
SEBUS	23.42** (4.76)	23.39 (4.77)	36.09** (8.73)	36.52** (8.68)
CAPGL	8.32* (5.08)	8.30* (5.09)	29.40** (9.32)	29.72** (9.26)
RENT	2.05 (5.73)	1.93 (5.74)	16.78* (10.50)	18.47* (10.44)
PENANN	-2.42 (5.97)	-2.53 (5.98)	-2.10 (10.95)	-0.61 (10.89)
OTHER	4.15 (6.42)	4.21 (6.43)	14.23 (11.77)	13.37 (11.70)
TIMEVAL	0.41 (0.28)	0.42 (0.28)	2.16** (0.52)	2.00** (0.52)

(Continued)

Table 1 (Continued)

Independent Variable	Hours A	Hours B	Professional Assistance A	Professional Assistance B
TAX	11.67 (21.29)	26.87 (45.01)	160.87** (39.02)	-44.77 (81.92)
ITEM	8.76* (4.93)	14.23 (15.11)	24.30** (9.04)	-49.79* (27.50)
TAXITEM		-19.07 (19.73)		257.94** (90.52)
Mean of Dependent Variable	26.9	26.9	51.4	51.4
Sample Size	574	574	574	574
R^2	0.107	0.107	0.215	0.226
Standard Error of Regression	42.3	42.3	77.5	77.0

Standard errors in parentheses.

**Significant at 95% confidence level.

*Significant at 90% confidence level.

compliance cost and the presence of self-employed business income and capital gains or losses. Households with both sources of income spend approximately thrity-two more hours and sixty-five more dollars than households with neither source of income. The value of time variable is estimated to have a significant positive association with monetary expense and a positive but not significant affect on own hours spent. The theory would suggest that a high value of time should induce substitution away from own time toward professional advice. The fact that time spent is positively correlated with the after-tax wage rate may be due to the fact that it is a better measure of competency in tax matters than educational attainment, so that higher wage rate people have both a higher oportunity cost of time and a higher return to investing their time working on their tax return.

In both Version A and B of the model, the estimated effect of the marginal tax rate on hours spent is rather small and not statistically significant. On the other hand, the regression equations do pick up a strong positive relationship between the tax rate and the amount of professional assistance purchased. This is apparent in Version A, where an increase in the tax rate of 0.1 is associated with $16 more dollars spent. In Version B, this association is shown to be present only for itemizers, but is very large ($21 more with an increase of 0.1) and significant for that group.

Finally, we note that, in Version A, the dummy variable for itemization is positive and at least marginally significant. The magnitude of the implied effect is large. Itemizers are estimated to spend 8.8 more hours on tax matters and 24.3 more dollars. In Version B, the estimated impact of itemization depends on the marginal tax rate. For a tax rate of 0.3, the estimated impact is approximately the same as in Version A.

Table 2 contains the results of estimating the more general model outlined in detail in Section 3. In the first three columns are the results of estimating the bivariate probit model of the choices of whether to itemize and whether to hire professional assistance. The results of within-regime, ordinary least-squares estimates with sample selection bias correction terms are presented in the last six columns.

Because of the multitude of coefficient estimates presented in Table 2, a comprehensive discussion of all the results is infeasible. Instead we will focus on the interesting relationships uncovered in the OLS estimations of Table 1, in order to compare the results obtained from the more "correct" specification of the empirical model.

The OLS estimates revealed an association between more complicated returns and higher compliance costs. This was manifested by the negative coefficients on EASY and the positive, large in magnitude, and statistically significant coefficients on SEBUS and CAPGL. The estimates of Table 2 indicate that the presence of a very simple return (EASY=1) has a significant negative association with the probability of hiring professional help for itemizers and, for itemizers who pay for help, a significant negative association with the amount of own time spent on tax filing. The other relationships are not statistically significant. Having self-employment income (SEBUS=1) is positively associated with hiring professional help for itemizers and has a strong positive effect on own time spent for itemizers who pay for help and on the amount of professional assistance purchased for all who purchase any help at all. Having capital gains or losses (CAPGL=1) has a statistically significant relationship only with the

Table 2

Parameter Estimates: Bivariate Probit Model and Ordinary Least Squares with Sample Selection Correction

Independent Variable	Bivariate Probit			OLS on Regime 1		OLS on Regime 2	OLS on Regime 3		OLS on Regime 4
	I^*	J_I^*	J_N^*	H	B	H	H	B	H
Constant	-1.08 (0.81)	1.67 (1.26)	-0.752 (2.23)	34.7 (49.7)	2.83 (81.3)	-18.1 (246.3)	-73.9 (61.1)	-121.8 (142.2)	-1.48 (30.5)
AGE	0.055* (0.034)	-0.035 (0.040)	0.020 (0.259)	-1.66 (1.92)	-2.56 (3.14)	-3.61 (3.34)	0.43 (4.31)	7.39 (10.0)	-8.48* (5.08)
AGESQ	-0.00065* (0.00037)	0.00052 (0.00048)	0.00006 (0.0025)	0.0258 (0.024)	0.041 (0.039)	0.035 (0.049)	0.014 (0.048)	-0.065 (0.11)	0.085 (0.059)
EDU	-0.014 (0.030)	-0.079** (0.026)	-0.101 (0.257)	-1.06 (2.49)	0.73 (4.07)	6.38 (8.33)	0.19 (2.75)	-5.08 (6.40)	4.86** (2.15)
MAR	0.375** (0.169)	0.027 (0.187)	-0.291 (0.937)	4.81 (9.33)	-26.4* (15.3)	-17.9 (14.0)	-5.9 (22.6)	33.0 (52.8)	-33.8 (24.3)
EASY	-0.131 (0.331)	-0.646** (0.302)	-0.089 (1.30)	-37.5* (24.3)	-6.41 (39.7)	52.6 (68.4)	-27.4 (20.8)	-28.6 (48.4)	8.84 (19.5)
INT	-0.163 (0.280)	-0.628** (0.259)	0.341 (0.746)	-20.5 (21.1)	-13.8 (34.6)	53.5 (66.3)	-9.9 (16.5)	18.7 (38.3)	-8.62 (21.4)
DIV	0.514** (0.198)	0.101 (0.174)	-0.944 (0.633)	-10.8 (9.5)	-13.1 (15.5)	-26.5 (20.6)	-32.9 (37.3)	-22.0 (86.8)	-34.3 (48.4)
SEBUS	0.182 (0.248)	0.291* (0.163)	0.677 (2.27)	30.5** (12.4)	43.6** (20.3)	-9.9 (32.4)	39.3 (32.0)	137.8* (74.5)	-16.0 (24.8)
CAPGL	0.284 (0.262)	0.125 (0.167)	0.119 (1.59)	13.3 (9.3)	38.4** (15.2)	-16.5 (17.6)	1.42 (30.1)	70.8 (70.0)	-37.9 (29.0)

Table 2 (Continued)

Independent Variable	Bivariate Probit			OLS on Regime 1		OLS on Regime 2	OLS on Regime 3		OLS on Regime 4
	I^*	J_I^*	J_N^*	H	B	H	H	B	H
RENT	-0.116 (0.300)	0.111 (0.203)	1.48 (2.19)	1.79 (9.64)	16.7 (15.8)	16.9 (14.3)	63.1* (31.6)	92.2 (73.6)	-69.0** (29.7)
PENANN	-0.157 (0.233)	-0.277 (0.203)	-1.13 (2.74)	-17.1 (12.9)	14.7 (21.0)	29.6 (33.7)	-47.5* (30.0)	-62.2 (69.7)	76.7** (21.6)
OTHER	0.064 (0.307)	0.061 (0.210)	-0.18 (0:72)	4.37 (10.9)	40.4** (17.8)	9.6 (10.8)	-30.3 (24.5)	13.0 (57.1)	-17.3* (8.7)
TIMEVAL	0.0219 (0.0155)	-0.0087 (0.0091)	0.040 (0.19)	0.205 (0.574)	3.39** (0.94)	0.37 (0.76)	3.36 (2.73)	7.02 (6.37)	-4.50** (2.16)
TAX	2.27** (0.90)	1.73** (0.80)	-0.699 (7.44)	15.9 (64.0)	242.5** (104.8)	-138.3 (203.3)	-96.1 (155.3)	27.3 (361.3)	-218.1 (217.7)
Correlation Coefficient	-	0.69* (0.43)	-0.48 (4.67)	-	-	-	-	-	-
Selectivity Variable #1				-113.3 (90.6)	-145.0 (148.1)	-73.1 (52.7)	36.6 (123.2)	204.1 (286.7)	-223.3* (126.2)
Selectivity Variable #2				134.8 (105.6)	11.6 (172.7)	-53.3 (153.6)	64.2 (54.2)	151.3 (126.1)	-128.8** (38.0)
Means of Dependent Variable	-	-	-	30.7	91.9	27.4	16.2	55.3	14.1
Sample size				302	302	172	32	32	68
R^2				0.10	0.34	0.16	0.65	0.57	0.67
Standard Error of Regression				51.7	84.5	32.8	20.0	46.6	14.9

Standard errors in parentheses. These statistics are computed without adjusting for the fact that the selectivity variables are estimated.

* Significant at 95% confidence level

amount of professional assistance purchased by itemizers.

The OLS regressions of Table 1 also suggested that the value of time had a positive association with both H and B, though the estimated coefficients on H were (just barely) statistically insignificant. The results in Table 2 indicate that while TIMEVAL does not significantly affect the probability of purchasing assistance, it is strongly positively associated with the amount purchased for itemizers and positively, but not significantly, related to the amount purchased for non-itemizers. The effect of TIMEVAL on own time spent is mixed. A higher value of TIMEVAL increases the likelihood of being an itemizer, which is associated with higher H. Given the regime, TIMEVAL has an insignificant positive association with H, except for the non-itemizing, zero B, households for whom there is a significant negative relationship.

According to the OLS analysis, the marginal tax rate had no significant association on own time spent but had a large and significant positive association with the amount of professional assistance purchased, especially for itemizing households. The more correct empirical model allows us to decompose these effects.

Evidently, the marginal tax rate has a clear association with the two discrete decisions of whether to itemize and whether to purchase professional assistance, but has a much less clear association wiht the choice of H and B for given regimes. In particular, a higher marginal tax rate increases the likelihood of itemizing, and increases the likelihood of purchasing professional assistance, though for itemizers only. The other statistically significant coefficient estimate is that, for itemizers, the amount of professional assistance purchased is positively associated with the marginal tax rate.

At the bottom of Table 2 we report the coefficients of the two selectivity variables for each equation. In each case the first listed selectivity variables is the expected value of the error term in the itemization probit equation (ε_i), conditional on the regime chosen. The second listed selectivity variable is the expected value of the error term in the professional assistance probit equation (ν_{Ii} for itemizers, and ν_{Ni} for non-itemizers), conditional on the regime chosen. The estimated coefficients on the selectivity variables are significantly different from zero only in the H equation for households in Regime 4 (non-itemizing, not paying for professional assistance). The negative signs of the estimated coefficients indicate that there will be a tendency to underestimate H when either the probability of itemization or the probability of paying for professional assistance is overestimated.

The interpretation of the coefficients of each of the two selectivity variables is the estimated covariance between the error in the two relevant probit equations and the error in the OLS equation. The inner product of the two coefficient estimates and the expected value of the error terms is the estimate of the expected unobservable component. For each of the six equations, this value is very large in absolute value compared to the observed mean of the dependent variable. This implies that the unobservable component of tax filing behavior, for both time and money spent, is very large compared to the component explained by the independent variables. In several cases these coefficients imply implausible predicted behavior of a taxpayer in a regime other than the one in which he is actually observed.

The large standard errors of the coefficients of the sample selection bias correction terms suggest that these implausible predictions are due to the multicollinearity of the estimate of the unobserved component of the choice of regime decision and the determinants of the conditional continuous choice of H and B. Remember that the same set of exogenous variables explain both the choice of regime and the compliance behavior conditional on regime. That the two relationships may be identified is entirely due to the non-linear relationship of the sample selection bias correction terms with the explanatory variables. The essence of this phenomenom is that the estimation technique is unable to precisely distinguish between the effect of the unobservable influences that determine the choice of regime and the effect of the explanatory variables that affect behavior within a regime.

In order to further investigate this issue, several alternative estimation strategies were pursued. First, observations with extreme outlying dependent variables were omitted. Because the technique depends critically on the normality assumptions made about the error terms, extreme observations whose presence strains the plausibility of this distributional assumption might unduly influence the results. Experimentation with deletion of outliers revealed that, as expected, many of the results were quite sensitive to this procedure. However, even with the deletion of five percent of the observations, the existence of some implausible predicted behavior upon change of regime did not disappear.

Another strategy we pursued was to impose certain restrictions on the very general structure outlined in Section 3. The first one we considered was to constrain the error covariances to be equal for all four H equations and to be equal for both B equations. The reasoning underlying this constraint is that the unobservable factor represents a taxpayer characteristic which will have the same effect on how much assistance is purchased regardless of itemization status and will also have the same effect on time spent regardless of itemization status or whether professional assistance is purchased. The second set of restrictions we considered served to constrain the coefficients on the explanatory variables, or a subset of the coefficients, to be identical across regimes.

None of these constraints altered our finding that the estimate unobervable component dominates the observable component in a seemingly capricious way. This failure leads us back to the presence of multicollinearity and forces us to conclude that there are insufficient obervations to enable us to distinguish the unobservable determinants of choice of regime and the conditional effect of the explanatory variables. Of course, this problem could undoubtedly be alleviated by arbitrarily altering the set of explanatory variables in the probit and OLS equations. This procedure was, however, not accepted because of the lack of any theoretical justification for differentiating between the two sets of explanatory variables.

One simple way to further investigate the effect of including the sample selection bias terms is to estimate the six OLS equations without these terms. These estimates are presented in Table 3. Comparing the results to those of Table 2, one notes that the pattern of coefficient estimates is broadly similar. The demographic variables do not exhibit a strong or consistent effect on tax compliance behavior. The presence of self-employment income has, for the most part, a statistically significant positive effect on hours spent and especially on the amount of professional assistance purchased. As in Table 2, the value of time has a significant positive effect on professional assistance purchased for itemizers, and an insignificant effect otherwise. The tax rate has a signifi-

TABLE 3

Parameter Estimates: Ordinary Least Squares without Sample Selection Correction

	Regime 1		Regime 2	Regime 3		Regime 4
	H	B	H	H	B	H
Constant	3.2 (33.9)	-56.3 (55.3)	29.9 (33.6)	-7.5 (48.2)	-3.2 (108.1)	30.9 (28.5)
AGEE	-0.021 (1.43)	-0.97 (2.34)	-2.9** (1.4)	-0.29 (2.82)	2.3 (6.3)	0.19 (0.91)
AGESQ	0.0019 (0.016)	0.020 (0.025)	0.032** (0.016)	0.010 (0.032)	-0.029 (0.073)	-0.0036 (0.0099)
EDU	1.20 (1.06)	1.61 (1.73)	1.48 (1.10)	1.75 (2.32)	-1.0 (5.2)	1.27 (1.03)
MAR	8.7 (7.6)	-18.0 (12.5)	0.80 (6.96)	-0.15 (11.7)	19.3 (26.2)	6.6 (5.0)
EASY	-17.7 (13.4)	0.52 (21.8)	8.76 (13.3)	-16.0 (19.5)	-3.5 (43.8)	-25.9** (11.6)
INT	-3.2 (9.9)	-9.1 (16.2)	9.63 (11.9)	-9.3 (15.5)	27.7 (34.8)	-31.6** (10.6)
DIV	-9.7 (7.4)	-6.1 (12.0)	-1.98 (6.32)	-9.7 (15.3)	-22.0 (34.4)	4.9 (6.4)
SEBUS	22.7** (7.7)	43.0** (12.6)	12.2 (7.23)	22.0 (13.6)	77.1** (30.6)	51.0** (9.0)
CAPGL	10.0 (8.0)	40.3** (13.1)	-2.3 (7.3)	3.8 (25.6)	54.4 (57.3)	9.5 (8.3)
RENT	-2.3 (9.0)	13.8 (14.7)	20.7** (9.5)	17.1 (12.8)	3.2 (28.6)	-31.1* (16.5)
PENANN	-10.2 (9.8)	15.5 (16.0)	5.9 (10.1)	-15.8 (14.1)	12.4 (31.6)	11.5* (7.5)
OTHER	3.7 (10.8)	40.2** (17.7)	14.6 (9.3)	-14.4 (23.2)	34.9 (51.9)	-19.6** (8.4)
TIMEVAL	0.60 (0.46)	3.6** (0.75)	0.38 (0.39)	1.6* (0.94)	1.36 (2.11)	-0.18 (0.70)
TAX	-15.6 (36.2)	256.5** (59.1)	43.9 (33.3)	-64.7 (43.8)	-98.7 (98.3)	76.1** (26.3)
Sample Size	302	302	172	32	32	68
R^2	0.09	0.33	0.15	0.58	0.52	0.60
Standard Error of Regression	51.7	84.4	32.9	20.6	46.2	16.1

** Significant at 95% confidence level.
* Significant at 90% confidence level.

cant positive association with professional assistance purchased, for itemizers, and with time spent, for non-itemizers. Remember that in the results with sample selection bias correction terms, the estimated effect of the tax rate on time spent in Regime 4 was negative and insignificant.

There are two major areas of divergence between the results of Table 2 and 3. The first area is the constant terms, which are very different. This reflects the phenomenon discussed above that the estimation technique of Table 2 indicates that there are very large unobservable effects on behavior, which are offset by the effects of the observed independent variables, including the fixed effect, or constant term. The second major area of divergence is the regression explaining time spent by non-itemizers, non-payers for professional assistance (Regime 4). When the sample selection bias correction terms are included, several of the coefficients have an unexpected sign, such as EASY, SEBUS, CAPGL, RENT, and TAX. In addition, some of the point estimates are implausibly large in absolute value (RENT and PENANN). For the most part, these problems do not arise in Table 3 when the sample selection bias correction terms are deleted. (On the other hand the estimates of Table 3 are, of course, subject to sample selection bias.) Our interpretation of this change is that the collinearity of the correction terms with the set of other exogenous variables made distinguishing the impact of the individual variables impossible on the basis of the small sample size that is available.

What conclusions can be drawn from the regression results presented in Tables 1, 2, and 3? Although the results from the different estimation approaches are not in all cases consistent, some clear findings do emerge. First, the presence of certain sources of income causes greater expenditure of time and money on tax compliance. This is especially true for self-employment income, and is also observed for capital gains income. A higher value of time, which we expect to be associated with a substitution away from own time to the use of professional assistance, is positively associated with the use of professional assistance in the simple OLS equations of Table 1, but when the regimes are separated, this effect is found to be significant and large only for itemizers. The estimated effect of the marginal tax rate on compliance behavior is somewhat mixed. None of the techniques indicate a significant positive association between the tax rate and the amount of one's own time spent on tax matters.[8] The regressions do reveal, though, a positive association between the marginal tax rate and the expenditure on professional tax assistance. The probit estimates imply that, at least for itemizers, a higher tax rate increases the likelihood of purchasing assistance. Furthermore, for itemizers who do purchase assistance, the amount of assistance purchased does have a significant and large association with the marginal tax rate.

6. Simulation of the Effect of Tax Simplification Proposals

In this section we use the results of the previous section to simulate the likely impact on compliance costs of changes in the tax law aimed at simplifying the filing process. In particular, we consider two law changes that have recently attracted some policy interest. The first policy eliminates the system of itemized deductions, to be replaced by a standard deduction for all taxpayers.[9] The second policy is a "flat-rate" income tax system which combines the elimination of itemized deductions, as in the first policy, with the further institution of a constant marginal tax rate for all taxpayers.[10]

Before discussing the simulation results, one important caveat must be mentioned. The sample population does not precisely represent the U.S. taxpaying population in a number of dimensions. For example, the sample population has a greater concentration of higher income households than the population as a whole and the proportion of households who itemize their deductions is substantially higher in the sample than in the U.S. If the rule that governs whether a given household makes it into our sample (which undoubtedly depends on the household's propensity to reply to a written questionnaire not unlike a tax form) is correlated with the dependent variable, then the parameter estimates may be biased. For the purpose of simulation, the fact that the sample population overrepresents itemizers implies that the impact of eliminating the itemization option is likely to be overestimated. Thus, in the computation of the figures that follow, the sample was weighted so that proportion of itemizers is equal to the U.S. proportion in 1982, 35.1 percent, and so that the distribution of income represents the income distribution of the U.S. taxpaying population.

For each of two policy changes, simulations using three different sets of estimates will be calculated. The first two simulations are based on Versions A and B of the OLS regressions of Table 1. The third simulation for each policy change is based on the bivariate probit estimates presented in Table 2 (The probit estimates are used to predict whether current itemizers will buy professional assistance when itemizing is not an option and to predict how changes in the tax rate and the after-tax wage rate will affect the likelihood of buying professional assistance.), and the OLS estimates by regime presented in Table 3.

The OLS estimates have the disadvantage of not being corrected for sample selection bias, and have the advantage of avoiding the implausible predictions of behavior of taxpayers who change regimes.

The simulated impact of eliminating itemized deductions is presented in the top half of Table 4. For the OLS models of Table 1, this simulation simply entails setting ITEM (and, in Version B, TAXITEM) to zero for all taxpayers. For the third model, it entails predicting the behavior of current itemizers as a weighted average of their predicted behavior according to the estimated structure of Regimes 3 and 4, the weights being the probability of paying for professional help, conditional on being a non-itemizer.

All three empirical models predict that eliminating the system of itemized deductions will be accompanied by a substantial reduction in expenditures on professional assistance, ranging from 39 percent according to model 1B to as low as 28 percent according to model B. Note also that the percentage of taxpayers that use professional assistance is predicted to decline by 12.6 percentage points. The models have different predictions about the impact on taxpayer time spent. While the OLS models of Table 1 predict a decline of per taxpayer hours of slightly more than three, the regime by regime estimates with endogenous regime selection predict a slight increase of 0.5 hours per taxpayer. All three models predict that the total resource cost of compliance, which is calculated by valuing time at the after-tax wage rate, declines, although the decline is between fifteen and twenty percent for models 1A and B, but only slightly more than one percent for model 3. Not itemizing deductions would apparently save some hours of record-keeping and also eliminate the primary reason that many people seek professional help. A more important effect, though, is that it increases the net price of professional tax assistance from $(1-t)P_B$ to P_B for former itemizers. For taxpayers in the 50 percent bracket, this amounts to a doubling of the price per unit of professional tax assistance. Because current

TABLE 4

SIMULATED IMPACT OF POLICY CHANGES, PER TAXPAYER

1. ELIMINATING ITEMIZED DEDUCTIONS

	CURRENT	PREDICTED CHANGE		
		1A	1B	3
Time Spent (hrs.)	22.3	-3.5	-3.2	+0.5
Professional Advice Purchased ($)	35.1	-9.5	-13.8	-10.2
% Using Professional Advice	40.8	0[a]	0[a]	-12.6
Total Resource Cost ($)	253.9	-47.3	-42.5	-2.8

2. FLAT-RATE SCHEDULE AND ELIMINATING ITEMIZED DEDUCTIONS

	CURRENT	PREDICTED CHANGE		
		1A	1B	3
Time Spent (hrs.)	22.3	-2.8	-2.3	-0.8
Professional Advice Purchased ($)	35.1	-4.7	-13.3	-12.6
% Using Professional Advice	40.8	0[a]	0[a]	-13.8
Total Resource Cost ($)	253.9	-31.4	-34.3	-8.0

[a]The change in itemization status is zero by assumption.

itemizers account for 64 percent of payments for assistance in the weighted sample, the substantial increase in price that accompanies the elimination of itemization apparently would have a large aggregate impact.

The second policy that we investigate changes the rate structure of income taxes from the present graduated one to one with a constant marginal tax rate of 0.20. The state tax system is assumed to be unchanged. A change in the tax rate has direct effects on the probability of purchasing professional assistance, and on the time and money spent on tax compliance, conditional on the regime chosen. A change in the tax rate also has indirect effects on these decisions because it changes the after-tax wage rate, the value of time. Note also that the switch to this flat rate tax schedule does not reduce everyone's marginal tax rate. On the contrary, many low-income individuals would experience an increase in their marginal tax rate.

The simulations indicate that, although the flat-rate, no itemizing, tax system would entail less resource cost than the current system, the flat-rate tax schedule does not by iteself reduce the aggregate cost of compliance by very much, if at all. Models 1a and 1b predict a small increase in both aggregate hours spent and professional assistance purchased if the tax schedule is flattened. Model 3 predicts a small decline in both time and money spent when the rate schedule is changed. Compared to the policy of only eliminating itemization, the change in the resource cost of compliance is estimated at between a 2% saving and a 6% additional cost.

There is one potentially significant reason that these results may underestimate the resource savings to be derived from a change to a flat-tax rate schedule. It is that the analysis assumes that the taxpayer's sources of income do not change when the marginal tax rate changes. To the extent that the current rate structure induces individuals to engage in income earning activities which require a relatively high cost of compliance, the estimates presented here will underestimate the resource savings.

7. Conclusions

Microeconomic data of the kind analyzed in this paper are potentially a rich source of information about tax compliance behavior. Our analysis of tax simplification suggests that significant resource savings can be expected from eliminating the system of itemized deductions, although no saving from changing to a single-rate tax structure can be confidently predicted.

As our introductory remarks emphasized, information about the likely resource savings of a particular tax simplification scheme is properly seen as one input of many that should be considered by policy-makers. The allocational and distributional impact of the changes must be weighed as well. It is hoped that this research can begin the task of enriching the debate about tax simplification by bringing to bear quantitative evidence on its benefits and costs.

Appendix

In this appendix we derive some of the comparative static implications of the first-order conditions, (3a) and (3b) of the text. To do so we form the total differentials of (3a) and (3b), allowing H, B, t, w^N (the after-tax wage rate), and I to change. This procedure yields

$$\text{(A-1)}\quad t[R_{HH}dH+R_{HB}dB+I(D_{HH}dH+D_{HB}dB) + D_H dI] + (R_H+ID_H)dt - \gamma dw^N = 0$$

$$\text{(A-2)}\quad t[R_{BH}dH+R_{BB}dB+I(D_{BH}dH+D_{BB}dB)+D_B dI] + (R_B+ID_B)dt + (Idt+tdI)P_B = 0$$

Manipulation of (A-1) and (A-2) yields

$$\text{(A-3)}\quad \frac{dH}{dt} = -(R_{BB}+ID_{BB})(R_H+ID_H) + (R_{BH}+ID_{BH})(R_B+ID_B+IP_B)/\Delta$$

$$\text{(A-4)}\quad \frac{dB}{dt} = (R_{HB}+ID_{HB})(R_H+ID_H) - (R_{HH}+ID_{HH})(R_B+ID_B+IP_B)/\Delta$$

where $\Delta = t[(R_{HH}+ID_{HH})(R_{BB}+ID_{BB}) - (R_{BH}+ ID_{BH})^2]$

Both (A-3) and (A-4) are positive as long as all the own second derivatives are negative and all the cross second derivatives are positive.

The response to a change in w^N is

$$\text{(A-5)}\quad \frac{dH}{dw^N} = \gamma(R_{BB}+ID_{BB})/\Delta$$

$$\text{(A-6)}\quad \frac{dB}{dw^N} = -\gamma(R_{HB}+ID_{HB})/\Delta$$

Clearly dH/dw^N is negative as long as R_{BB} and $D_{BB} < 0$, but dB/dw^N depends on the sign and, for itemizers, perhaps the relative magnitude of the cross derivatives.

The comparative statics with respect to a small change in I are

(A-7) $$\frac{dH}{dI} = t[-(R_{BB}+ID_{BB})D_H + (R_{BH}+ID_{BH})(P_B+D_B)]/\Delta$$

(A-8) $$\frac{dB}{dI} = t[(R_{HB}+ID_{HB})D_H - (R_{HH}+ID_{HH})(P_B+D_B)]/\Delta$$

Equations (A-1)-(A-8) are based on the assumption that both (3a) and (3b) of the text hold as equalities. In many cases, though, B is zero and (3b) does not hold as an equality. In these cases, the effect of changes in exogenous variables on H simplify to

(A-9) $$\frac{dH}{dt} = \frac{-(R_H+ID_H)}{t(R_{HH}+ID_{HH})}$$

(A-10) $$\frac{dH}{dw^N} = \frac{\gamma}{t(R_{HH}+ID_{HH})}$$

(A-11) $$\frac{dH}{dI} = \frac{-D_H}{(R_{HH}+ID_{HH})}$$

The signs of (A-9), (A-10), (A-11) will be positive, negative, and positive as long as own time spent is subject to locally diminishing returns.

Footnotes

1. In defense of unpredictability, it is sometimes argued that it ensures conservative decision-making on tax matters by risk-averse agents. This may be preferable to the alternative of having explicit rules for every possible situation (see Roberts, 1979). Stiglitz (1982) and Weiss (1976) have also argued, on different grounds, that randomness in the tax law may be desirable under certain circumstances.

2. The subsidization of homeownership due to the tax-exempt status of the rental value of owner-occupied dwellings provides an example where the presence of a tax expenditure is compatible with tax simplicity. Elimination of the subsidy by requirng taxpayers to estimate the imputed rental value would clearly add to the administrative and compliance costs of the income tax system. Disallowing the deductibility of mortgage interest payments would not eliminate the subsidy to homeownership, only the subsidy to debt-financed homeownership.

3. The model therefore ignores expenses incurred in the process of tax filing other than hiring professional advice, such as the cost of buying tax guides or subscribing to newsletters that provide tax-related information.

4. In order to treat illegal tax evasion, the consumer problem would have to be modelled as a choice under uncertainty, where the marginal expected utility from unpunished evasion is balanced against the (negative) marginal expected utility of detection and the subsequent punishment for evasion. The seminal paper on this issue is Allingham and Sandmo (1972). Cross and Shaw (1981, 1982) argue that the problems of legal tax avoidance and illegal tax evasion ought, from both a theoretical and policy perspective, to be treated simultaneously .

5. Although estimates of the coefficients of the reduced-form equations (10a)-(10f) are sufficient for the purpose of making predictions about the effect of various policy changes, it is interesting to inquire whether the coefficients of the equations (7a)-(7d) can be identified. (Equations (7a)-(7d) are not truly structural because they contain elements of both the utility function and the compliance technologies.) In fact, this structure of the model is such that they in fact can all be identified (Sickles and Schmidt, 1978).

To see this, we first consider equations (10a)-(10c). Note that the ordinary least-squares estimation of (10c) yields a consistent estimate of the vector α_{I1}'. Note further that, for any element of α_{I1}',

$$\alpha_{I1} = -\alpha_{I0} \quad k(\beta_{I1} + \alpha_{I1} \cdot \beta_{I0}) + k(\alpha_{I1} + \alpha_{I0} \cdot \beta_{I1}) .$$

But the bracketed terms in the above expression are equal to the coefficients of X_i in (10b) and (10a), respectively. Thus, the estimate of an element of α_{I1} in addition to the reduced-form estimates of (10a) and (10b) enable us to identify α_{I0}. So in this model the parameters of the H equations, (7a) and (7c), are identified without the usual exclusion restrictions. In fact, α_{I0} is overidentified, since each of the elements of α_{I1}' and β_{I1}' provides an estimate of α_{I0}.

Identification of the parameters of the B equations does, however, require the usual restrictions. Fortunately, there is a natural exclusion restriction because the after-tax wage rate does not affect B, given H; it does, though, affect H, given B.

6. There is a substantial literature, based on the theory of labor supply, concerned with imputing wage rates to nonworking women based on their characteristics and the wage rate and characteristics of working women. However, direct application of that methodology to the problem at hand seems inappropriate because there is no clear distinction between those for whom a wage rate is available and those for whom it is not available. (Examples of unusable replies to the wage rate question are "time-and-a-half," "retired," or "variable." Others left the answer space blank.) Thus it is invalid to claim that the reservation wage of those with no wage rate available (because they are not working) must be greater than the wage rate that could be earned.

7. In interpreting the coefficients on the sources of income variables, it is important to bear in mind that EASY takes on a value of one only when none of the sources of income is present. Thus, for example, the estimated impact of having dividends, compared to having no non-wage income, is found by subtracting the coefficient on EASY from the coefficient on DIV.

8. The notable exception is the significantly positive estimated coefficient on TAX in Regime 4 of Table 3.

9. The standard deduction may, as it does now, vary depending on certain taxpayer characteristics. What is important is that the appropriate deduction is trivially easy to calculate.

10. The common federal marginal income tax rate is assumed to be 0.20. The total marginal tax rate includes the appropriate Minnesota tax, which is assumed to be unchanged.

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