Effects of the United States Tax System on Transitions into Self-Employment

Donald Bruce

Syracuse University

September 1998

This paper was prepared for presentation at the OECD/CERF/CILN International Conference on Self-Employment, held in Burlington, Ontario, September 24-26, 1998. I offer my thanks to the Canadian Employment Research Forum for financial assistance, as well as to Douglas Holtz-Eakin and Jan Ondrich for generous advice and comments. I also thank Dan Feenberg and the National Bureau of Economic Research for use of the TAXSIM program, Joel Slemrod and Atul Rustgi in the Office of Tax Policy Research at the University of Michigan for providing access to and assistance with the Ernst & Young Tax Research Database, Barbara Butrica in the Center for Policy Research at Syracuse University for tireless assistance with the PSID, and Becky Porcello for outstanding research assistance. Jim Bruce, Jamie Emerson, Katherin Ross, Herb Schuetze, and Bob Weathers also provided helpful comments. Full responsibility for any remaining errors is, of course, mine alone.

ABSTRACT

This paper examines the impact of U.S. income and payroll taxes on the decision among wage-and-salary employees to become self-employed. Using longitudinal data from the Panel Study of Income Dynamics, I find that differential tax treatment of the self-employed has significant effects on the probability of a entry into self-employment. A five percentage point increase in the difference in an individual's expected *average* tax rates in wage-and-salary and self-employment increases this probability by about 0.3 percentage points. Conversely, an equivalent increase in the difference in *marginal* tax rates is found to reduce this probability by about 2.4 percentage points.

Donald Bruce
Center for Policy Research
426 Eggers Hall
Syracuse University
Syracuse, NY 13244
(315)443-9056
(315)443-1081 (fax)
djbruce@maxwell.syr.edu

1. Introduction

The proportion of the working population in self-employment has grown steadily since the early 1970s, due mainly to the increased entry of female entrepreneurs and the growth in the number of independent contractors in the economy. The most recent estimate of the number of self-employed workers in the economy is about 14 million, 23 million if independent contractors are counted (Pink, 1998). Schuetze (1998) provides some evidence, however, of a recent downturn in self-employment rates. In searching for a cause for this decline, changes in the relative tax treatment of the self-employed come to the forefront.

Long (1982a) cites Goode (1949) in pointing out why the differential tax treatment might affect the decision to become self-employed. First, the taxation of self-employment income depends entirely on voluntary compliance, while much of the wage-and-salary tax payments are withheld by employers. Second, many expenses related to self-employment are deductible in calculating taxable income. More generally, tax changes could decrease self-employment rates either by making self-employment relatively less attractive or by making wage-and-salary work relatively more attractive. The two factors mentioned by Goode (1949) represent tax *pull* effects, or conditions that might entice potential entrepreneurs to become self-employed. Alternatively, tax *push* effects might include a general increase in taxes on wage-and-salary work, such as rate increases or base-broadening measures.

Some important changes in the relative tax treatment of these two types of workers occurred during the 1980s, making self-employment much less tax-advantaged than it used to be. These changes could be responsible for at least part of the reduced attraction toward self-employment. It is the goal of this study to estimate the incentive or disincentive effects of the U.S. income and payroll tax systems on self-employment start-ups. If the tax system is indeed discouraging entrepreneurship, the resulting misallocation of productive inputs away from self-employment causes economic inefficiency. However, if the original tax advantages bestowed upon the self-employed were misguided, the recent changes could represent an overdue correction. While I do not attempt to estimate the socially optimum supply of self-employees, I do examine the relative responsiveness to tax changes among those potentially considering entrepreneurship.

The remainder of the paper is organized as follows: Section 2 provides a brief history of the differential tax treatment of the self-employed. Section 3 reviews the existing empirical literature on taxes and self-employment, and Section 4 describes the data and empirical strategy used in this study. Empirical findings are presented in Section 5, with conclusions and suggestions for further research in Section 6. To anticipate the primary results, I find that taxes have significant effects on the probability that an individual will leave a wage-and-salary job to become self-employed. The most robust estimates indicate that a five percentage point increase in the difference between an individual's expected marginal tax rates in wage-and-salary employment and self-employment reduces his transition probability by about 2.4 percentage points. Average tax rate differentials are found to have much smaller but statistically significant positive effects.

2. A History of the Differential Tax Treatment of the Self-Employed

Since their inception, the U.S. income and payroll tax systems have differentiated between income earned on a wage-and-salary job and that earned in self-employment. This has been a necessary distinction due to the lack of a third party (the firm) in the tax collection process for the self-employed. While wage-and-salary workers have both income and payroll taxes withheld by their employers, the self-employed must assume this responsibility individually.

Income from wage-and-salary employment has been subject to a payroll tax since 1937, its proceeds serving as the primary funding for the Social Security system. Generally, a percentage of a worker's earnings (up to some maximum taxable amount) is withheld, and that percentage is matched by the employer. Self-employment income was not subject to a similar tax until 1951. From 1951 through the early 1960s, the statutory rate on self-employment income was one-and-a-half times the rate on wage-and-salary income. From the early 1960s through 1984, however, self-employment income was subject to a tax that was less than one-and-a-half times the wage-and-salary rate. Figure 1 shows the net statutory payroll tax rates for wage-and-salary (combined and employer alone) and self-employed individuals.[1]

Beginning in 1984, in an effort to equalize the treatment of wage-and-salary and self-employment income, the statutory self-employment rate was set equal to two times the wage-and-salary rate. Essentially, self-employed individuals were liable for payroll taxes equal to the employer and employee shares for wage-and-salary individuals. While tax credits were used to phase in the change from 1984 to 1990, this series of events represents a dramatic change in the relative tax treatment of self-employment income.

Coupled with these changes in the payroll tax system during the 1980s was a significant, although perhaps less dramatic, change in the relative income tax treatment of wage-and-salary and self-employed individuals. For both categories of workers, tax rates were reduced and the tax base was increased. For the self-employed, a number of limitations on what could be claimed as business-related deductions were passed. Further, up until 1992, the self-employed could not deduct health insurance costs on their income tax returns. Conversely, more liberal provisions relating to the business use of one's home made self-employment relatively more attractive during this time. Despite some small gains, the 1980s rendered self-employment significantly less tax-advantaged relative to wage-and-salary employment.

3. A Review of the Empirical Literature

The changes in the relative tax treatment of wage-and-salary and self-employment income during the 1980s have received little attention in terms of empirical research. Despite the rapidly growing literature on self-employment, both in terms of cross-sectional and longitudinal studies, only a few authors have examined tax incentives or disincentives. Of these, most have considered the effects of the aggregate tax climate using time series data. Some have used microdata, but have been forced to use aggregated tax variables for reasons of endogeneity. The only studies to use tax information on an individual level were constrained by the use of cross-sectional data.

Long (1982a) investigated the effects of differential income tax treatment on the SMSA-level ratio of self-employment to total employment, using 1970 Census data. He found that a 10 percent increase in the average marginal income tax rate in an SMSA increased the self-employment rate in that SMSA by 6.4 percent. Further, a \$300 increase in average income tax liability increased the self-employment rate by 1 percent. This supports the evasion/avoidance argument, as higher marginal tax rates increase the reward to reducing--legally or illegally--one's taxable income by becoming self-employed.

Later work by Long (1982b) used the same data but on an individual level for males between the ages of 25 and 64. Linear probability models of whether or not one is self-employed on expected income tax liability under wage-and-salary employment indicated substantial and significant tax effects. Echoing his aggregate findings, an increase in expected wage-and-salary tax liability of 10 percent was found to increase the probability of being self-employed by 7.4 percent. While Long's results might indicate a large degree of sensitivity to taxes in the self-employment decision, they could also be interpreted as evidence of liquidity constraints. Essentially, those with higher expected tax liabilities probably have higher incomes, and are thus more likely to be able to afford the start-up costs of going into business.

Moore (1983) expanded on Long's research, but focused on the payroll tax differentials between wage-and-salary and self-employment. Indeed, Moore's was the first (and only) study to examine both individual income and the payroll taxes using microdata. He used 1978 CPS data for males between 25 and 65 years of age who worked 35 or more hours per week and 30 or more weeks per year to estimate linear probability models and logits of self-employment status. His methods were similar to Long's (1982b), but Moore's regressions included a separate variable for expected payroll tax liability under wage-and-salary. The effect of the income tax variable was significant, but much smaller than those estimated by Long (1982a and 1982b). Moore found that a 10 percent increase in expected payroll tax liability caused a 5 to 8 percent increase in the probability of being self-employed. He also found that a 10 percent increase in the difference between after-tax self-employment income and after-tax wage-and-salary income increased the probability of being self-employed by 1 percent.

Two later studies used time series data to investigate aggregate tax effects on self-employment rates. Blau (1987) followed Long (1982a) and estimated aggregate time series regressions using U.S. data for 1948 through 1982. His tax variables consisted of two marginal tax rates, however, for income of $7,000 and $17,000 respectively. While his findings at the higher marginal tax rate supported Long's, Blau found that increases in lower-bracket marginal tax rates actually reduced the self-employment rate. This empirical puzzle was not explained. Parker (1996) more closely resembled Long (1982a), but for a 1959 to 1991 time series of United Kingdom data. Again, higher marginal tax rates were found to increase self-employment rates. He followed Blau's (1987) method of using two marginal tax rates associated with two different levels of income, but failed to support Blau's findings at the lower rate.

Robson and Wren (1998) provided an interesting theoretical model which incorporated both average and marginal tax rates. Their model predicted, and time series regressions confirmed, that higher average tax rates reduced self-employment rates while higher marginal tax rates increased self-employment. This divergence was attributed to the assumptions that self-employment earnings more closely resemble the value of the individual's marginal product of labor (i.e., a higher average tax rate reduces the net value of the marginal product), and that higher marginal tax rates increase the payoff to evading or avoiding taxes by under-reporting income or increasing business-related deductions.

Schuetze (1998) provided the most recent look at the effects of taxes on self-employment, using aggregate "tax climate" variables in a cross-sectional comparison of the United States and Canada. Using data for 1983 through 1994, he found that a 10 percent increase in the U.S. average marginal tax rate in one year caused a 2.1 percent increase in the probability of being self-employed in the following year.[2]

While these studies conclude almost universally that higher marginal tax rates increase self-employment rates, they do not actually estimate individual-level tax sensitivity. Two recent papers by Carroll, Holtz-Eakin, Rider, and Rosen (1995 and 1997) investigate the impact of taxes on decisions among entrepreneurs to hire additional workers and make capital investments. Their focus is on existing entrepreneurs, and they find that these individuals are indeed cognizant of their own personal tax situations. Specifically, marginal tax rate increases are found to reduce both mean investment expenditures and the probability of hiring employees.

It is the intention of this paper to examine whether or not income and payroll taxes effect individual decisions to become self-employed. More precisely, I wish to estimate the tax pull effects rather than the tax push effects by examining the post-entry tax situations of potential entrepreneurs. If taxes matter, we might expect to find that those who stand to gain the most from self-employment in terms of tax rates or liabilities are also the most likely to enter self-employment. By definition, panel data is required for this type of analysis. Further, the use of panel data permits the consideration of time-varying tax differentials between wage-and-salary and self-employment income.

4. Data and Empirical Specification

I follow a number of earlier studies of transitions into self-employment in developing an empirical strategy to examine the possible effects of taxes on the decision to move from wage-and-salary work to self-employment. Specifically, I estimate equations of the following type:

$$D_{i,t+1} = \beta' X_{i,t} + \gamma T_{i,t+1} + \mu_i + \nu_{i,t+1}, \tag{1}$$

where $D_{i,t+1}$ is a dummy variable that equals one if individual i moves from wage-and-salary at time t to self-employment at time $t+1$, and zero if he remains wage-and-salary in both periods. The $X_{i,t}$ vector includes a constant term and a set of time t exogenous variables, and the $T_{i,t+1}$ term represents the individual-specific difference in self-employment and wage-and-salary tax rates at time $t+1$. The error term in this equation includes an individual-specific time-invariant random effect (μ_i) to capture unobserved individual heterogeneity, and an independently and identically distributed residual component ($\nu_{i,t+1}$) with zero mean and finite variance. A convenient empirical specification for equation (1) is a random effects probit.

Of course, I only observe one actual tax rate–either in wage-and-salary or in self-employment--for each individual in each year depending on the sector that is actually chosen. Consequently, I estimate each individual's labor earnings in the alternative sector for each time period. Earnings regressions of the following form are estimated for each sector in each year:

$$Y_{i,t}^{WS} = \alpha Z_{i,t} + \varepsilon_{i,t} \tag{2}$$

$$Y_{i,t}^{SE} = \phi Z_{i,t} + e_{i,t} \tag{3}$$

where *Y* is gross labor income, *i* indexes individuals, and *t* indexes time. $Z_{i,t}$ consists of indicators for age and educational attainment, and the error terms are normally distributed with zero mean and finite variance. The coefficients from these regressions are then used to predict wage-and-salary earnings for self-employed individuals, and vice versa. I use these predicted income figures together with the National Bureau of Economic Research (NBER) TAXSIM model to calculate predicted alternative-sector tax rates, and their difference from the actual tax rates, in each year. I also calculate payroll tax liability and include it in all tax rate calculations.

Take, for example, a wage-and-salary individual who becomes self-employed in the next survey year. His post-transition earnings (in self-employment) are observed, and his actual taxes and rates can be accurately predicted using the TAXSIM program. His hypothetical earnings and taxes in wage-and-salary must be estimated, however. After this prediction procedure is complete, I have two sets of earnings and tax data for this and all other individuals which are used to create necessary tax *differentials* for the empirical analysis. An in-depth discussion of the tax rate calculation process is provided in the appendix.

To this point, I have not considered the potential endogeneity of the tax rate differential in the above transition probit. Whether or not an individual moves from wage-and-salary to self-employment will certainly have some effect on his calculated tax rate differential. To control for this endogeneity, I use the instrumental variables approach suggested in the study of tax reforms and investment by Cummins, Hassett and Hubbard (1994) and later used by Carroll, Holtz-Eakin, Rider, and Rosen (1995 and 1997).

Specifically, I compute two separate tax rate differentials for each *t* to *t+1* transition. The first, discussed above, uses *t+1* incomes and tax rules and represents the closest approximation to the actual differential. Each individual's post-transition tax rate differential is a function of all observable and unobservable individual behavior. The second--hypothetical--differential, uses time *t+1* income under the time *t* tax rules. The TAXSIM model allows this approach to be implemented quite easily. The hypothetical differential captures the difference in tax rates that would have existed had the tax rules remained constant. The instrumental variable is then equal to the difference in these two tax rate differentials, and represents the part of the actual differential that is caused by the change in the tax code only. The part that is a result of individual behavior is subtracted out of the actual differential.

I use data from the 1970 through 1992 waves of the Panel Study of Income Dynamics (PSID) in the estimation. This rich panel data set provides ample information on individual, household, and occupational characteristics. Further, sample sizes for self-employed individuals are large enough to permit longitudinal analysis of the start-up decision. However, yearly self-employed sample sizes are often small enough that some form of pooled data analysis is preferred.

Following much of the existing empirical literature, I confine the analysis to male heads of household who are between the ages of 25 and 54. The dynamics of self-employment among younger and older individuals and among females are likely to be inherently different.[3] Further, the head-of-household restriction is a direct result of the fact that the PSID provides self-employment status for household heads and their spouses only. These assumptions leave a sample of 2,638 individuals with at least one year of data on self-employment status.

For the purposes of this study, an individual is considered to be self-employed if he reports working for himself or for himself and someone else at the time of the survey. This latter category is minimal--usually less than one percent of the working sample in each year. These individuals are kept in order to increase sample sizes and to capture all experiences in self-employment.[4]

Figure 2 shows self-employment rates over time for the sample of 2,638 individuals. Rates are shown beginning in 1979, as this is the earliest year for which the TAXSIM program can generate tax estimates. The self-employment rate (the percentage of workers reporting self-employment) is shown to have remained fairly constant over time for this group, at a rate usually between 17 and 18 percent. Figure 2 also presents wage-and-salary to self-employment transition rates over time. Despite fairly constant self-employment rates, the transition rate shows a noticeable decline over time for this sample. The reduction in the tax "payoff" to becoming self-employed may be one of the many factors at work in this downturn during the 1980s.

For an individual to enter the transition probit, he must be wage-and-salary in the first period and either wage-and-salary or self-employed in the next period, and he must be out of school. Consequently, I have a select sample. To be precise, the fact that these individuals enter the estimation process depends on the fact that they have not yet made an observable transition into self-employment, or, if they did, they later returned to wage-and-salary work. The individual random effect is therefore correlated with the transition indicator, resulting in the so-called initial conditions problem.

To correct for this type of initial conditions bias, I follow the method suggested by Orme (1997). The first stage of this procedure involves a probit of a dummy variable that takes the value of one for wage-and-salary in the first observed occupation (and zero for self-employed) on a set of individual, household, and regional characteristics in the initial period. Tax variables do not enter this stage of the estimation, which is identified via a dummy variable for veteran status as of the first job. Note that each individual's initial observation may come from any year during the panel period (1970 through 1990) if the individual happens to be in school or out of the labor force in the first panel years.

In a slight variation on Orme's (1997) procedure, an inverse Mills ratio is calculated using the estimates of this first-stage probit.[5] This Mills ratio is included as a regressor in the random effects transition probit, along with a similar set of individual, household, and regional characteristics. In order for this procedure to be appropriate in this case, however, individuals who are self-employed in their initially observed occupation or who have entered self-employment at some previous point in the panel period must be omitted. Essentially, removing these observations transforms the initial conditions problem into a selection problem. We are left with a sample of initially wage-and-salary workers who will be followed until they either make a single transition into self-employment, they drop out of the survey, or they reach the end of the panel period.

Approximately 11 percent of the individuals in the initial sample are self-employed in their first observed jobs. Only about 26 percent of all first jobs actually occur in 1970, the first year in my sample. The remaining 74 percent are distributed nearly evenly over the years from 1971 to 1990, indicating that I observe actual initial conditions for the majority of the sample.

When I look only at those who make at least one transition from wage-and-salary to self-employment, slightly less than 10 percent were self-employed in their first job. Next, looking at the remaining sample of those who were initially wage-and-salary and eliminating multiple transitions leaves a total sample of 206 first observable transitions to analyze. However, a few of these individuals do not report information for one or more of the various control variables, which restricts the actual regression sample size to 1,193 individuals, 184 of whom eventually make a transition into self-employment.[6] As noted above, the fact that TAXSIM is not able to estimate tax rates before the 1979 tax year restricts the number of years of data that can enter the transition probits. Pooling the observations from these 1,193 individuals over the period from 1979 to 1990 yields a final sample of 5,622 person-years of usable data.

Again, I follow previous studies of transitions into self-employment in selecting a set of control variables to include in $X_{i,t}$. Individual characteristics include age (in quadratic form), a set of indicators for educational attainment of less than high school (11 or fewer years of education), some college (between 13 and 15 years of education), college (16 years of education), and post-college (more than 16 years of education), and an indicator for nonwhite race. Household-level controls include marital status, entered as a dummy variable for married or not, and a series of continuous variables for the number of children in the household in various age groups.

As a transition into self-employment carries certain opportunity costs, I also include a set of job-specific controls. These consist of tenure (in months) on the current wage-and-salary job entered in quadratic form, and dummies for part-time employment and union membership in the pre-transition year. Finally, regional and macroeconomic effects are controlled for via a set of indicators for residence in the north-central, south, and west regions, a dummy for whether or not the individual lives in a metropolitan statistical area (MSA), and the local area (county) unemployment rate.

A number of studies have found that greater wealth holdings or windfall financial gains increase the likelihood of a transition into self-employment.[7] In this so-called liquidity constraint literature, a continuous wealth or inheritance variable is often added as a regressor. While the PSID does not include a yearly wealth variable, I can imperfectly control for the possibility of liquidity constraints with a measure of the household's yearly income from capital. This will presumably be positively correlated with the household's (unobserved) total wealth holdings.

Table 1 provides definitions of these control variables, and Table 2 presents descriptive statistics for the regression sample. Individuals making a transition into self-employment are, before the transition, slightly younger than those who do not enter self-employment. They have worked fewer months on their wage-and-salary job, are more likely to be white, are more likely to be working part-time, and are much less likely to belong to a union.

To investigate the potential impacts of differential tax treatment on the decision to enter self-employment, a number of tax variables are used. First, I use the difference in expected average tax rates between wage-and-salary and self-employment. Since the decision to become self-employed is largely an "all or nothing" decision in the PSID (given the small percentage of workers who report working for themselves and someone else), such a differential–which represents the per-dollar tax payoff to becoming self-employed–should have a positive effect on the probability of making a transition.

However, if the decision to enter self-employment is actually being made at the margin (i.e., if individuals are deciding where to allocate their next hour of labor supply), a difference in expected marginal tax rates is more appropriate. This is especially true given that the reward gained from an extra dollar of business-related deductions (or from an extra dollar of shielded income) will equal the individual's marginal tax rate. For these reasons, I also estimate a probit with the difference in expected marginal tax rates to test this effect.

It is not clear whether the marginal tax rate differential should have a positive or a negative effect on the transition probability. If tax-push effects are dominant, the coefficient should have a positive sign (i.e. individuals with the highest marginal tax rates under wage-and-salary will be the most likely to enter self-employment to escape this higher taxation). However, if tax-pull effects are more important, this differential will have a negative effect on the transition probability as larger differences would indicate lower rewards to reducing taxable income (by becoming self-employed) at the margin. In other words, workers would be enticed into becoming self-employed only if there are prospects of greater tax payoffs, since a given level of business-related deductions generates larger tax benefits at higher marginal tax rates.

Table 3 provides a preliminary look at the actual and hypothetical post-transition tax situations for the regression sample. Looking first at those who do not enter self-employment, their predicted total taxes would have been nearly $1,500.00 lower if they had entered self-employment. All average and marginal tax rates would have been lower in self-employment. A similar pattern emerges for those who make a transition into self-employment. Their actual total tax payments are, on average, nearly $3,400.00 lower than they would have been had they remained in their wage-and salary job. Further, all tax rates except the state-level average tax rate are lower in self-employment than they would have been in wage-and-salary.

The last three rows of Table 3 provide summary statistics for the differential variables used in the probits. The total (federal and state income plus payroll) average and marginal tax rates in wage-and-salary exceed the corresponding total rates in self-employment for both categories of individuals, but by a greater amount for those who make a transition. Finally, those entering self-employment suffer a much larger drop in after-tax household income. While those who do not enter self-employment would have lost $971.11 on average had they entered, those who make a transition lose an average of $4,214.60 as a result of entering.

5. Results and Discussion

Since this is the first empirical study of self-employment transitions to attempt to control for initial conditions bias, it is useful to first gauge the impact of this particular part of the estimation. Table 4 presents results from three separate random effects probits. Tax variables are left out of these probits for the purpose of isolating the impact of the initial conditions correction. The first column follows the work in earlier studies, and contains results from a random effects probit on all person-years of pooled data without any controls for initial conditions bias.

My correction procedure requires that I analyze only those individuals who have never previously been self-employed (in the panel period), so the second column repeats the process after eliminating all observations from individuals who were initially or previously self-employed. The third and final column in Table 4 presents results from the correction procedure, using an inverse Mills ratio from the first-stage probit of the initial condition.[8]

Comparing the first two columns shows that the different sample required for the initial conditions correction results in only minor differences in patterns of significance for the control variables. Perhaps more importantly, adding the selection term in column 3 has virtually no effect on signs and significance patterns for the other control variables. While it is rather large and significant in its own right, the fact that its inclusion has no discernible effect on the other coefficients should be somewhat refreshing to those researchers who have not performed this correction in previous work. The statistical significance indicates that initial conditions clearly matter in the self-employment transition process, however, so all remaining probits will include a similar selection term.

Before moving on to the analysis of tax effects, note that the effects of the other variables in column 3 are generally consistent with findings in earlier studies. First, age affects the transition probability in a u-shaped manner. Those at the younger and older extremes of the age distribution are more likely to enter. Tenure on the wage-and-salary job also affects this probability in a u-shaped manner. Essentially, those who enter self-employment are likely to have spent either a very little or a very long time in their pre-transition job.

Minorities and union members are significantly less likely to enter self-employment. The minority effect has been previously documented by Meyer (1990) among others, and union membership is likely capturing an important job-lock effect. The effect of children in the household depends on their age distribution. Having more children in the household between the ages of 3 and 5 increases the transition probability, while having more children that are between the ages of 14 and 17 reduces the probability. This is presumably a result of the fact that the younger children can be placed in daycare or nursery school facilities, and the older children might be preparing to enter college. A parent's attitudes toward the inherent risk of becoming self-employed might carry different weights at these times.

Contrary to Schuetze (1998), I find that higher unemployment rates have a negative impact on self-employment transitions. This divergence is likely due to different degrees of aggregation in the respective unemployment rate variables. Schuetze used a national unemployment rate, while I use the county-level unemployment rate. Higher unemployment at the local level might reduce one's probability of becoming self-employed by reducing the likelihood that he would be able to regain wage-and-salary employment should his business fail. National unemployment rates, however, more closely reflect macroeconomic effects such as the degree of downsizing in the economy. Self-employment entry rates typically increase during economic downturns, which is the result Schuetze finds.

Turning now to Table 5, we begin to observe the effect of controlling for differential tax treatment on the self-employment entry decision. This table uses a (wage-and-salary minus self-employment) difference in average tax rates (ATR), and presents rather interesting results. The first column contains coefficients and bootstrapped standard errors from a random effects probit which includes this raw ATR differential as a regressor.[9] As expected, the effect is positive and statistically significant, indicating that those with a larger per-dollar tax payoff from entering self-employment are also more likely to be the ones who actually choose to enter.

The question of endogeneity remains, however, so column 2 presents results from a two-stage instrumental variables estimation process as described above. While patterns of significance for the non-tax variables remain largely unchanged, the effect of the instrumented tax rate differential is now negative and not statistically significant. To determine the extent to which endogeneity is an actual problem in this situation, I performed the test suggested by Rivers and Vuong (1988). This test involves inserting the potentially endogenous variable along with the estimated residual vector from the proposed first-stage instrumenting equation into the transition probit. A significant coefficient on the residual indicates that endogeneity is indeed a serious problem. However, the Rivers-Vuong test for this random effects probit fails to reject the null hypothesis of exogeneity--the coefficient on the residual term is small and insignificant. Using the results in column 1, then, increasing the ATR differential by 5 percentage points would increase the average self-employment transition probability by only about 0.4 percentage points. This translates into an elasticity of about 0.06.

As noted above, however, it is not clear whether one should examine average or marginal tax rate differences in estimating the actual impact of taxes on the probability of entering self-employment. Table 6 is similar to Table 5, except that the tax rate differential variables all involve marginal tax rates (MTR) instead of average tax rates. The results in column 1 indicate that, similar to the ATR result, the MTR differential has a positive and significant effect on the probability of entry. A similar instrumental variables approach reverses the sign of this variable, however, while maintaining--indeed increasing--its strong statistical significance. Further, the Rivers-Vuong test rejects the null of exogeneity, indicating that column 2 contains the appropriate set of results. Performing a similar simulation reveals that a 5 percentage point increase in the (instrumented) MTR differential causes a reduction in the average self-employment transition probability of about 2.4 percentage points. The associated elasticity is approximately -0.60.

Table 7 examines whether ATRs and MTRs truly have these opposing effects by including both variables in a single random effects probit. Column 1 contains results without an instrumental variables approach, while column 2 presents the IV results. The above explanation holds in this case, and the coefficients are essentially unchanged. Those contemplating a transition into self-employment are obviously more concerned with effects at the margin than they are with average effects. The Rivers-Vuong test rejects the null hypothesis of joint exogeneity in this case.

Taking the contents of Tables 5, 6, and 7 together, the actual tax effects become clear. First, the positive and significant effect of the ATR differential indicates that those with the most to gain per dollar of income are slightly more likely to enter self-employment. However, the statistically and quantitatively more significant negative impact of the instrumented MTR differential reveals an opposite effect. Essentially, a higher MTR differential can indicate a large drop in taxable income as a result of entering self-employment. Those with higher values of this difference would suffer the largest drop in earnings, and should be the least likely to make a transition. Further, those with the lowest, or most negative, MTR differential would likely see a dramatic increase in earnings--and marginal tax rates--as a result of becoming self-employed. They are, consequently, the most likely to enter.

The extent to which this is an income effect rather than a price effect can be examined by including the difference in after-tax household income as a regressor in addition to the MTR differential. Table 8 presents results from two probits, without (column 1) and with (column 2) an instrumenting equation for the MTR and net income differentials. In column 1, the MTR effect is apparently unchanged but the coefficient on the net income differential is strangely positive (and significant), indicating that larger expected income losses from entering self-employment actually increase the probability of entry. A probable explanation is that those with the highest incomes in wage-and-salary are the ones that can afford to take on the risk--and lower initial earnings--of self-employment.   The presence of liquidity constraints has been well-documented in the self-employment literature, and this merely reinforces the earlier finding that money matters.

However, the results in column 2 are quite puzzling. It appears that the dual instrumental variables approach has rendered all other control variables statistically insignificant. In fact, the only variables with any significance are the Mills ratio for the initial conditions correction and the MTR differential. The income effect disappears. Further, a Rivers-Vuong test rejects the null hypothesis of joint exogeneity. Despite this somewhat confusing result, the effect of the tax rate differential itself is unchanged–an independent tax effect is still evident.

6. Conclusions

Those considering a switch to self-employment are apparently aware of their individual-level tax situations. This paper has shown that the differential tax treatment of wage-and-salary and self-employed workers has important effects on transition probabilities. Specifically, larger individual-specific differences in marginal tax rates in the two sectors is found to reduce self-employment entry rates. This effect is independent of the difference in after-tax incomes, and probably represents the perceived payoff to additional dollars of shielded self-employment income. Individual average tax rate differentials have much smaller positive effects.

These findings are relatively consistent with the conclusion in earlier studies that higher marginal tax rates increase self-employment. However, the reasoning behind this effect is no longer one of a more macroeconomic tax-push nature. If this were the case, the sign on the MTR differential would be postive. This study has found that tax-pull effects win out in the entry decision, as those who stand to gain the most from the ability to deduct more business-oriented expenses or to shield more income from taxation are the most likely to enter.

More research is certainly warranted. For example, similar studies could be undertaken that focus on younger or older workers, or on women. Further, very little is known about the presence of tax effects on those who are already self-employed. The differential tax treatment (and increased complexity) might hasten the departure of marginally successful entrepreneurs, thereby compounding the entry effects found in this paper.

Endnotes

1. By “net” statutory payroll tax rates, I mean inclusive of phase-in credits and exclusion amounts. In a further effort to equalize the treatment of wage-and-salary and self-employment income, as of 1990 the self-employment payroll tax applies to only 92.35 percent of self-employment earnings, and half of the self-employment taxes due may be deducted in the computation of adjusted gross income (AGI). The gross, pre-credit, statutory social security tax rates for wage-and-salary (employer plus employee contribution) and self-employment have been identical since 1984.

2. This result is for the U.S. data. Stronger effects were found in the Canadian data.

3. A number of other studies have analyzed self-employment for these groups. For example, Fuchs (1982) examines self-employment among older individuals. Dunn and Holtz-Eakin (1996) and Blanchflower and Meyer (1994) consider younger individuals. Devine (1994), MacPherson (1988), and Bruce (1998) look at female self-employment.

4. Concerns have been raised in many studies about the appropriateness of screening a self-employed sample on the basis of earnings or hours worked. Such a procedure would supposedly eliminate the “partially self-employed” or those claiming to be fully self-employed but who in fact are not really working or in the labor force on a full-time basis. Holtz-Eakin, Joulfaian, and Rosen (1994b) note that such screening has virtually no effect on empirical results, however.

5. Orme’s (1997) procedure is designed to allow observations coming from more than one initial condition to enter the final stage of the estimation process.

6. Fitzgerald, Gottschalk, and Moffitt (1998) examine the impact of sample attrition on the representativeness of the PSID, concluding that attrition is not generally a serious problem. While I have not repeated their procedure to gauge the impact of attrition as it relates to self-employment, it is not clear whether my reduced sample should be representative of any particular population. For this reason, none of the results in this study use PSID (or any other) weights.

7. Evans and Leighton (1989), Evans and Jovanovich (1989), and Meyer (1990) are among the pioneering studies of liquidity constraints and self-employment. Blanchflower and Oswald (1990) and Holtz-Eakin, Joulfaian, and Rosen (1994a and 1994b) also reveal the importance of available financial capital to self-employment entry and duration.

8. Results from this first-stage probit, and all other results noted but not included in this paper, are available from the author upon request.

9. Bootstrapped standard errors are generated by repeating the estimation procedure 50 times for each random effects probit. When an instrumental variables process is used, the entire two-stage process is run 50 times. Experimentation with 150 repetitions required much more computing time but revealed no changes in significance patterns.

References

Blanchflower, David G. and Bruce D. Meyer, 1994. "A Longitudinal Analysis of the Young Self-Employed in Australia and the United States." *Small Business Economics* 6, 1-19.

Blanchflower, David G. and Andrew J. Oswald, 1998. "What Makes an Entrepreneur?" *Journal of Labor Economics* 16:1, 26-60.

Blau, David M. 1987. "A Time-Series Analysis of Self-Employment in the United States." *Journal of Political Economy* 95:3, 445-467.

Bruce, Donald. 1998. "Do Husbands Matter? Married Women Entering Self-Employment." Mimeo, Syracuse University.

Butrica, Barbara A. and Richard V. Burkhauser, 1997. "Estimating Federal Income Tax Burdens for Panel Study of Income Dynamics (PSID) Families Using the National Bureau of Economic Research TAXSIM Model." Aging Studies Program Paper No. 12, Maxwell Center for Demography and Economics of Aging, Center for Policy Research, Syracuse University.

Carroll, Robert, Douglas Holtz-Eakin, Mark Rider, and Harvey S. Rosen. 1995. "Income Taxes and Entrepreneurs' Use of Labor." Mimeo.

Carroll, Robert, Douglas Holtz-Eakin, Mark Rider, and Harvey S. Rosen. 1997. "Entrepreneurs, Income Taxes, and Investment." Office of Tax Policy Research Working Paper No. 98-16, University of Michigan Business School.

Cummins, J., K. Hassett, and R.G. Hubbard. 1994. "A Reconsideration of Investment Behavior Using Tax Reforms as Natural Experiments." *Brookings Papers on Economic Activity* 2, 1-59.

Devine, Theresa J. 1994. "Changes in Wage-and-Salary Returns to Skill and the Recent Rise in Female Self-Employment." *American Economic Review* 84:2, 108-113.

Dunn, Thomas, and Douglas Holtz-Eakin, 1996. "Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links." NBER Working Paper No. 5622.

Evans, David S. and Boyan Jovanovic, 1989. "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints." *Journal of Political Economy* 97:4, 808-27.

Evans, David S. and Linda S. Leighton, 1989. "Some Empirical Aspects of Entrepreneurship." *American Economic Review* 79:3, 519-35.

Fitzgerald, John, Peter Gottschalk, and Robert Moffitt, 1998. "An Analysis of Sample Attrition in Panel Data." *Journal of Human Resources* 33:2, 251-99.

Feenberg, Daniel and Elisabeth Coutts, 1993. "An Introduction to the TAXSIM Model." *Journal of Policy Analysis and Management* 12:1, 189-94.

Fuchs, Victor R. 1982. "Self-Employment and Labor Force Participation of Older Males." *Journal of Human Resources* 17:3, 339-57.

Goode, Richard. 1949. "The Income Tax and the Supply of Labor." *Journal of Political Economy* 57, 428-32.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen. 1994a. "Sticking it Out: Entrepreneurial Survival and Liquidity Constraints." *Journal of Political Economy* 102:1, 53-75.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen. 1994b. "Entrepreneurial Decisions and Liquidity Constraints." *Rand Journal of Economics* 25:3, 334-47.

Joulfaian, David and Mark Rider, 1998. "Tax Evasion by Small Business." Working paper, Office of Tax Analysis, Department of the Treasury.

Long, James E. 1982a. "Income Taxation and the Allocation of Market Labor." *Journal of Labor Research* 3:3, 259-76.

Long, James E. 1982b. "The Income Tax and Self-Employment." *National Tax Journal* 35, 31-42.

MacPherson, David A. 1988. "Self-Employment and Married Women." *Economics Letters* 28, 281-284.

Meyer, Bruce D. 1990. "Why Are There So Few Black Entrepreneurs?" NBER Working Paper No. 3537.

Moore, Robert L. 1983. "Self-Employment and the Incidence of the Payroll Tax." *National Tax Journal* 36, 491-501.

Parker, Simon C. 1996. "A Time Series Model of Self-employment under Uncertainty." *Economica* 63, 459-75.

Pink, Daniel H. 1998. "The 1099 Rebellion." *The New Republic*, April 27, 19-21.

Rivers, Douglas, and Quang Vuong. 1988. "Limited Information Estimators and Exogeneity Tests for Simultaneous Probit Models." *Journal of Econometrics* 39: 347-366.

Robson, Martin T. and Colin Wren, 1998. "Marginal and Average Tax Rates and the Incentive for Self-Employment." Working paper, University of Newcastle.

Schuetze, Herb J. 1998. "Taxes, Economic Conditions and Recent Trends in Male Self-Employment: A Canada-U.S. Comparison." Working paper, McMaster University.

Figure 1: Social Security Tax Rates, 1950-1995

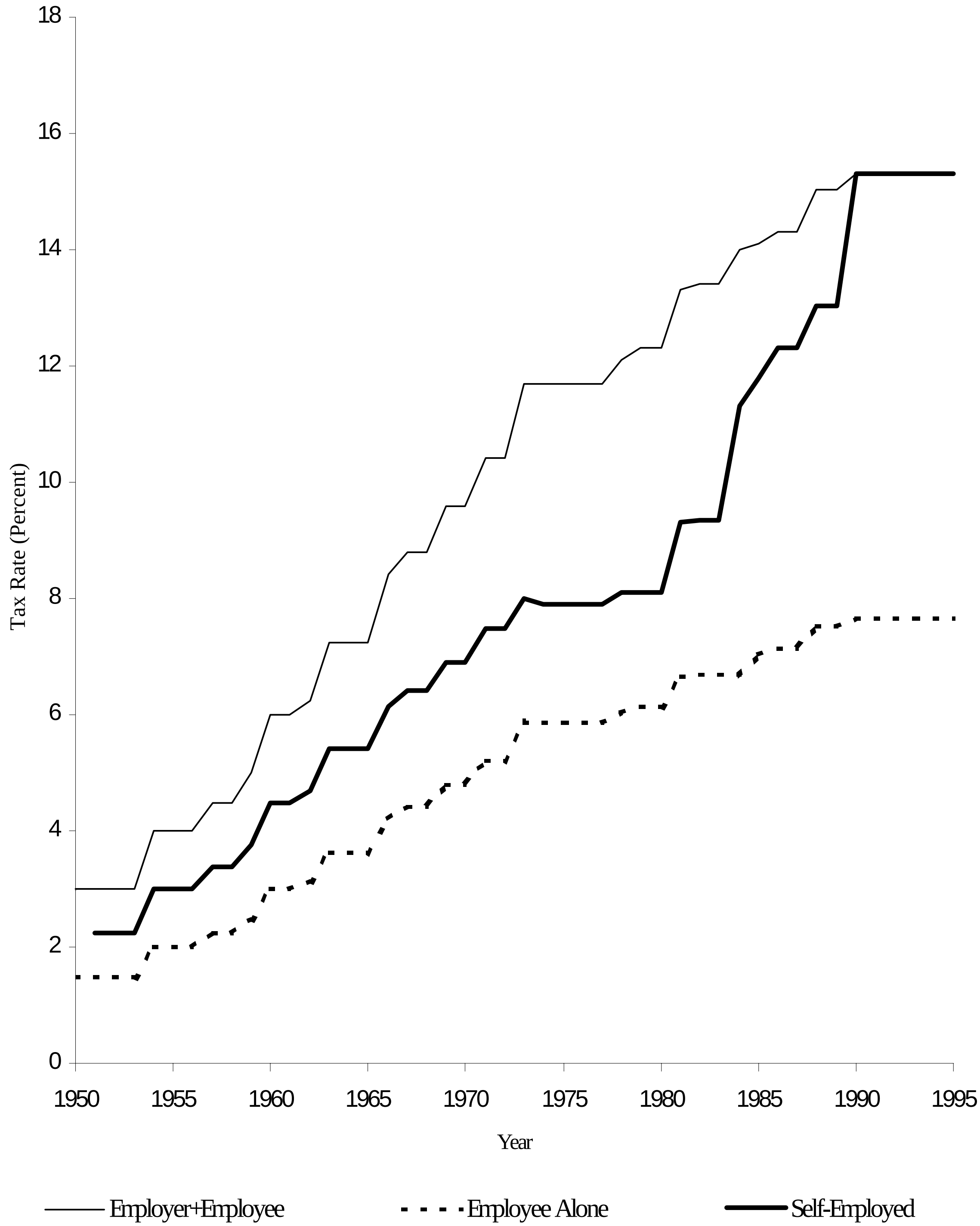

Figure 2: Self-Employment Rate and Self-Employment Entry Rate, 1979-1991
Male PSID Household Heads, Ages 25-54

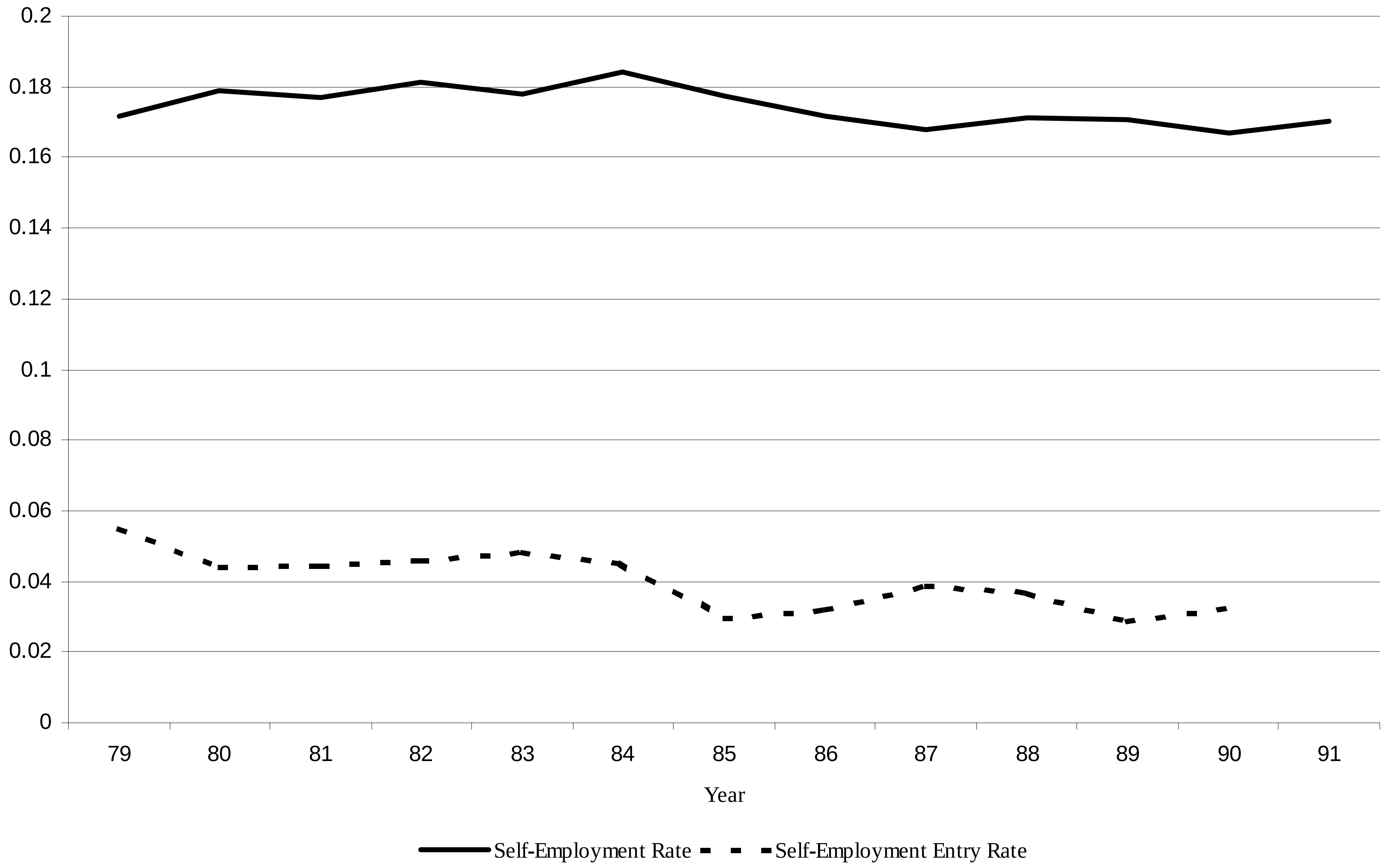

Table 1: Variable Definitions

Variable	**Definition**
Self-employment Transition*	=1 if wage-and-salary in year *t* and self-employed in year *t+1*
Age	Age in years
Age Squared	Age*Age
Tenure	Tenure on current job in months
Tenure Squared	Tenure*Tenure
Dropout*	=1 if less than 12 years of education
Some College*	=1 if 13 to 15 years of education
College Graduate*	=1 if 16 years of education
Post-College*	=1 if more than 16 years of education
Minority*	=1 if black or other non-white race
North Central*	=1 if living in North Central region
South*	=1 if living in South region
West*	=1 if living in West region
Married*	=1 if married, with spouse present
Income from Capital	Household's income from capital ($1,000s)
Part-Time*	=1 if worked between 52 and 1,820 annual hours
Kids 1 to 2	Number of children in the household between the ages of 1 and 2
Kids 3 to 5	Number of children in the household between the ages of 3 and 5
Kids 6 to 13	Number of children in the household between the ages of 6 and 13
Kids 14 to 17	Number of children in the household between the ages of 14 and 17
Union*	=1 for membership in a labor union
Unemployment Rate	County unemployment rate
MSA*	=1 if living in a metropolitan statistical area

Note: When not otherwise indicated, all variables represent information at year *t*.
* = Dummy variable.

Table 2: Summary Statistics for Regression Variables

Variable	All		Those remaing in a wage-and-salary job		Those making a transition into self-employment	
Self-emp. Transition	0.033	(0.178)	0		1	
Age	30.346	(5.160)	30.379	(5.162)	29.348	(5.012)*
Age Squared	947.478	(360.813)	949.549	(360.990)	886.283	(351.004)*
Tenure	65.966	(59.844)	66.893	(60.144)	38.587	(41.864)*
Tenure Squared	7932.178	(14405.81)	8091.213	(14574.52)	3232.000	(6358.83)*
Dropout	0.082	(0.274)	0.081	(0.273)	0.109	(0.312)
Some College	0.250	(0.433)	0.251	(0.433)	0.223	(0.417)
College Graduate	0.186	(0.389)	0.187	(0.390)	0.174	(0.380)
Post-College	0.123	(0.329)	0.122	(0.327)	0.168	(0.375)
Minority	0.076	(0.266)	0.078	(0.268)	0.043	(0.204)*
North Central	0.260	(0.439)	0.260	(0.439)	0.255	(0.437)
South	0.304	(0.460)	0.305	(0.460)	0.266	(0.443)
West	0.200	(0.400)	0.198	(0.399)	0.250	(0.434)
Married	0.835	(0.371)	0.834	(0.372)	0.859	(0.349)
Income from Capital	0.729	(2.675)	0.735	(2.704)	0.531	(1.603)
Part-Time	0.143	(0.350)	0.141	(0.348)	0.212	(0.410)*
Kids 1 to 2	0.338	(0.550)	0.338	(0.550)	0.337	(0.559)
Kids 3 to 5	0.290	(0.530)	0.286	(0.525)	0.418	(0.639)*
Kids 6 to 13	0.398	(0.752)	0.399	(0.751)	0.359	(0.769)
Kids 14 to 17	0.071	(0.318)	0.072	(0.321)	0.027	(0.194)*
Union	0.206	(0.405)	0.211	(0.408)	0.076	(0.266)*
Unemployment Rate	6.283	(2.753)	6.298	(6.298)	5.832	(2.431)*
MSA	0.573	(0.495)	0.574	(0.574)	0.543	(0.499)
N	5622		5438		184	

Note: Entries are means, with standard deviations in parentheses.
* = A two-tailed *t* test rejects the null hypothesis of equal means (for columns 2 and 3) at the 5% significance level.

Table 3: Summary Statistics for Tax Variables

Variable	Those remaing in a wage-and-salary job	Those making a transition into self-employment
Actual Total Taxes	11903.64 (9225.58)	8262.28 (10529.33)
Predicted Total Taxes in Alternate Sector	10580.41 (9691.89)	11641.88 (8825.72)
Actual Federal ATR	12.10 (7.69)	10.98 (13.18)
Predicted Federal ATR in Alternate Sector	11.09 (9.02)	13.22 (7.80)
Actual Federal MTR	23.68 (8.56)	21.47 (9.78)
Predicted Federal MTR in Alternate Sector	22.37 (8.99)	25.75 (8.96)
Actual State ATR	2.80 (2.70)	2.81 (7.82)
Predicted State ATR in Alternate Sector	2.65 (3.98)	2.72 (2.10)
Actual State MTR	5.07 (3.36)	4.61 (3.38)
Predicted State MTR in Alternate Sector	4.83 (3.30)	5.23 (3.63)
Actual Payroll ATR	12.60 (5.04)	9.76 (8.62)
Predicted Payroll ATR in Alternate Sector	11.22 (6.87)	11.55 (4.43)
Actual Payroll MTR	12.73 (4.77)	11.02 (3.60)
Predicted Payroll MTR in Alternate Sector	10.09 (5.30)	13.68 (2.91)
Total ATR Differential	2.91 (9.68)	4.96 (10.12)
Total MTR Differential	4.11 (8.91)	7.26 (9.43)
Net-of-tax Household Income Differential	971.11 (10887.76)	4214.60 (8018.64)

Note: Entries are means, with standard deviations in parentheses. Differential variables are calculated as the (actual or predicted) value under wage-and-salary minus the (actual or predicted) value under self-employment. See text for additional details.

ATR = Average Tax Rate

MTR = Marginal Tax Rate

Table 4: Pooled Transition Probit Results: Effects of Initial Conditions Bias Correction

Variable	Larger Sample	Smaller Sample	Smaller Sample with Correction
Age	0.020 (0.028)	-0.104 (0.066)	-0.091 (0.052)*
Age Squared	-0.00018 (0.00037)	0.00151 (0.00094)	0.00122 (0.00077)
Tenure	-0.003 (0.001)**	-0.005 (0.002)**	-0.006 (0.001)**
Tenure Squared	5.40e-06 (2.37e-06)**	7.94e-06 (5.91e-06)	8.44e-06 (4.62e-06)*
Dropout	0.011 (0.073)	0.054 (0.126)	0.031 (0.124)
Some College	-0.018 (0.060)	-0.019 (0.095)	-0.014 (0.096)
College Graduate	0.025 (0.069)	-0.013 (0.107)	0.010 (0.104)
Post-College Education	0.054 (0.068)	0.083 (0.116)	0.114 (0.105)
Minority	-0.142 (0.086)*	-0.315 (0.153)**	-0.283 (0.141)**
North Central	0.0004 (0.062)	-0.026 (0.101)	-0.030 (0.104)
South	-0.041 (0.063)	-0.101 (0.101)	-0.106 (0.098)
West	0.061 (0.068)	0.082 (0.103)	0.067 (0.095)
Married	-0.028 (0.064)	0.118 (0.111)	0.100 (0.095)
Income from Capital	0.004 (0.003)	-0.006 (0.015)	-0.011 (0.012)
Part-Time	0.094 (0.053)*	0.142 (0.093)	0.140 (0.084)*
Kids 1 to 2	0.029 (0.042)	-0.057 (0.068)	-0.049 (0.063)
Kids 3 to 5	0.076 (0.039)**	0.225 (0.065)**	0.244 (0.059)**
Kids 6 to 13	0.027 (0.025)	0.035 (0.058)	0.050 (0.053)
Kids 14 to 17	-0.004 (0.037)	-0.206 (0.164)	-0.206 (0.115)*
Union	-0.330 (0.056)**	-0.480 (0.114)**	-0.383 (0.109)**
Unemployment Rate	-0.020 (0.008)**	-0.047 (0.015)**	-0.047 (0.012)**
MSA	-0.052 (0.042)	-0.048 (0.075)	0.017 (0.077)
Mills Ratio	-	-	0.958 (0.506)*
N	16026	5622	5622
Sample Transition Probability	0.039	0.033	0.033

Notes: Entries are random-effects probit coefficients with robust (and bootstrapped, for column 3) standard errors in parentheses. Regressions also include indicators for the year of the observation and a constant term.

* = Statistically significant at the 10% level

** = Statistically significant at the 5% level.

Table 5: Pooled Transition Probit Results: Using Average Tax Rate Differentials

Variable	No Endogeneity Control	IV for ATR Differential
Age	-0.082 (0.052)	-0.099 (0.079)
Age Squared	0.00112 (0.00077)	0.00132 (0.00117)
Tenure	-0.006 (0.001)**	-0.005 (0.002)**
Tenure Squared	9.36e-06 (4.52e-06)**	7.99e-06 (8.13e-06)
Dropout	-0.012 (0.132)	0.061 (0.185)
Some College	0.005 (0.095)	-0.025 (0.106)
College Graduate	0.056 (0.111)	-0.017 (0.178)
Post-College Education	0.166 (0.111)	0.076 (0.239)
Minority	-0.283 (0.142)**	-0.293 (0.182)
North Central	-0.030 (0.105)	-0.031 (0.100)
South	-0.105 (0.099)	-0.111 (0.086)
West	0.059 (0.097)	0.070 (0.106)
Married	0.101 (0.095)	0.103 (0.084)
Income from Capital	-0.012 (0.012)	-0.011 (0.017)
Part-Time	0.159 (0.085)	0.131 (0.083)
Kids 1 to 2	-0.051 (0.064)	-0.046 (0.059)
Kids 3 to 5	0.243 (0.060)**	0.246 (0.067)**
Kids 6 to 13	0.051 (0.055)	0.050 (0.052)
Kids 14 to 17	-0.215 (0.115)*	-0.206 (0.174)
Union	-0.400 (0.109)**	-0.376 (0.117)**
Unemployment Rate	-0.046 (0.012)**	-0.048 (0.016)**
MSA	0.013 (0.077)	0.018 (0.076)
Mills Ratio	0.994 (0.504)**	0.956 (0.417)**
ATR Differential	0.010 (0.003)**	-0.006 (0.031)
N	5622	5622
Sample Transition Probability	0.033	0.033

Notes: Entries are random-effects probit coefficients with bootstrapped robust standard errors in parentheses. Regressions also include indicators for the year of the observation and a constant term. The first-stage instrumenting equation includes an identical set of variables in addition to the instrument.

* = Statistically significant at the 10% level

** = Statistically significant at the 5% level.

Table 6: Pooled Transition Probit Results: Using Marginal Tax Rate Differentials

Variable	No Endogeneity Control	IV for MTR Differential
Age	-0.079 (0.052)	-0.275 (0.063)**
Age Squared	0.00109 (0.00077)	0.00353 (0.00093)**
Tenure	-0.006 (0.001)**	-0.004 (0.002)**
Tenure Squared	1.00e-05 (4.65e-06)**	-1.09e-06 (6.63e-06)
Dropout	-0.014 (0.142)	0.508 (0.157)**
Some College	-0.011 (0.097)	-0.051 (0.113)
College Graduate	0.046 (0.106)	-0.363 (0.116)**
Post-College Education	0.126 (0.106)	0.007 (0.121)
Minority	-0.279 (0.142)**	-0.449 (0.149)**
North Central	-0.037 (0.103)	0.061 (0.120)
South	-0.108 (0.097)	-0.081 (0.124)
West	0.048 (0.097)	0.195 (0.123)
Married	0.090 (0.095)	0.160 (0.115)
Income from Capital	-0.013 (0.012)	0.008 (0.014)
Part-Time	0.158 (0.085)*	-0.007 (0.107)
Kids 1 to 2	-0.044 (0.063)	-0.005 (0.070)
Kids 3 to 5	0.250 (0.061)**	0.286 (0.066)**
Kids 6 to 13	0.055 (0.055)	0.060 (0.058)
Kids 14 to 17	-0.240 (0.111)**	-0.263 (0.145)*
Union	-0.407 (0.115)**	-0.309 (0.126)**
Unemployment Rate	-0.045 (0.012)**	-0.055 (0.014)**
MSA	0.003 (0.079)	0.060 (0.085)
Mills Ratio	0.954 (0.502)*	1.173 (0.538)**
MTR Differential	0.017 (0.004)**	-0.123 (0.010)**
N	5622	5622
Sample Transition Probability	0.033	0.033

Notes: Entries are random-effects probit coefficients with bootstrapped robust standard errors in parentheses. Regressions also include indicators for the year of the observation and a constant term. The first-stage instrumenting equation includes an identical set of variables in addition to the instrument.

* = Statistically significant at the 10% level

** = Statistically significant at the 5% level.

Table 7: Pooled Transition Probit Results: Using Average and Marginal Tax Rate Differentials

Variable	No Endogeneity Control	IV for ATR and MTR Differentials
Age	-0.075 (0.052)	-0.268 (0.075)**
Age Squared	0.00104 (0.00078)	0.00344 (0.00108)**
Tenure	-0.006 (0.001)**	-0.004 (0.002)**
Tenure Squared	1.04e-05 (4.60e-06)**	-6.79e-07 (7.00e-06)
Dropout	-0.038 (0.146)	0.481 (0.200)**
Some College	-0.001 (0.096)	-0.040 (0.125)
College Graduate	0.070 (0.111)	-0.337 (0.159)**
Post-College Education	0.157 (0.114)	0.042 (0.206)
Minority	-0.282 (0.143)**	-0.439 (0.152)**
North Central	-0.036 (0.104)	0.062 (0.120)
South	-0.107 (0.098)	-0.076 (0.124)
West	0.045 (0.098)	0.192 (0.128)
Married	0.093 (0.095)	0.157 (0.118)
Income from Capital	-0.013 (0.012)	0.008 (0.014)
Part-Time	0.167 (0.085)**	0.002 (0.115)
Kids 1 to 2	-0.047 (0.063)	-0.008 (0.071)
Kids 3 to 5	0.249 (0.061)**	0.284 (0.065)**
Kids 6 to 13	0.055 (0.056)	0.060 (0.059)
Kids 14 to 17	-0.242 (0.112)**	-0.263 (0.148)*
Union	-0.415 (0.115)**	-0.315 (0.131)**
Unemployment Rate	-0.045 (0.012)**	-0.054 (0.014)**
MSA	0.003 (0.079)	0.059 (0.080)
Mills Ratio	0.975 (0.502)*	1.175 (0.540)**
ATR Differential	0.006 (0.003)**	0.006 (0.026)
MTR Differential	0.015 (0.005)**	-0.123 (0.010)**
N	5622	5622
Sample Transition Probability	0.033	0.033

Notes: Entries are random-effects probit coefficients with bootstrapped robust standard errors in parentheses. Regressions also include indicators for the year of the observation and a constant term. The first-stage instrumenting equations include an identical set of variables in addition to the instruments.

* = Statistically significant at the 10% level

** = Statistically significant at the 5% level.

Table 8: Pooled Transition Probit Results: Adding After-Tax Household Income Differentials

Variable	No Endogeneity Control	IV for After-Tax Difference
Age	-0.091 (0.056)	-0.357 (0.654)
Age Squared	0.00130 (0.00082)	0.00352 (0.00618)
Tenure	-0.006 (0.002)**	0.001 (0.020)
Tenure Squared	1.02e-05 (6.40e-06)	-1.08e-05 (4.80e-05)
Dropout	-0.046 (0.150)	1.199 (2.567)
Some College	0.026 (0.085)	-0.477 (1.453)
College Graduate	0.170 (0.104)	-2.576 (6.933)
Post-College Education	0.297 (0.115)**	-4.216 (13.786)
Minority	-0.222 (0.163)	-1.342 (2.744)
North Central	-0.070 (0.096)	0.174 (0.936)
South	-0.107 (0.075)	-0.601 (1.376)
West	0.047 (0.076)	0.179 (0.519)
Married	0.084 (0.099)	0.428 (1.157)
Income from Capital	-0.018 (0.015)	0.049 (0.114)
Part-Time	0.213 (0.084)**	-0.327 (0.966)
Kids 1 to 2	-0.038 (0.054)	0.196 (0.513)
Kids 3 to 5	0.224 (0.062)**	0.386 (0.477)
Kids 6 to 13	0.056 (0.062)	0.042 (0.338)
Kids 14 to 17	-0.208 (0.151)	-0.304 (0.430)
Union	-0.449 (0.126)**	-0.166 (0.472)
Unemployment Rate	-0.039 (0.013)**	-0.121 (0.269)
MSA	-7.69e-05 (0.063)	0.229 (0.305)
Mills Ratio	1.015 (0.407)**	1.068 (0.368)**
MTR Differential	0.014 (0.004)**	-0.124 (0.014)**
Income Differential	1.95e-05 (3.48e-06)**	-2.86e-04 (9.75e-04)
N	5515	5515
Sample Transition Probability	0.032	0.032

Notes: Entries are random-effects probit coefficients with bootstrapped robust standard errors in parentheses. Regressions also include indicators for the year of the observation and a constant term. The first-stage instrumenting equations include an identical set of variables in addition to the instruments.

* = Statistically significant at the 10% level

** = Statistically significant at the 5% level.

Appendix

A Note on the Calculation of Tax Rates for the PSID Using the National Bureau of Economic Research TAXSIM Model

The income tax rates used in this paper were all calculated using the National Bureau of Economic Research (NBER) TAXSIM model. While the Panel Study of Income Dynamics (PSID) contains assorted federal tax variables, the use of TAXSIM enables the consistent calculation of a richer set of tax information for various individual characteristics. Further, it allows the calculation of both federal and state taxes. For more specific information regarding TAXSIM, see Feenberg and Coutts (1993) or the internet version of TAXSIM, which is available at **http://www.nber.org/~taxsim/taxsim.html**.

In calculating the baseline, or actual income tax rates for this paper, I followed the method of Butrica and Burkhauser (1997) with two exceptions. First, out of convenience, they combined the labor income of the head and spouse into one variable. I separated these in order to more easily analyze changes in the head's labor income. Second, they assumed that all filers took the standard deduction for their calculations, while I make use of a rich set of tax return data to impute itemized deductions. All other variables are created exactly as in Butrica and Burkhauser (1997). Specifically, TAXSIM requires information on tax filing status, state of residence, the number of dependent exemptions, the number of old age exemptions, taxable income in various categories, and expenditures on rent, property taxes, and child care. Since their purpose was to provide alternative tax variables to those provided in the PSID, Butrica and Burkhauser (1997) follow PSID conventions whenever possible in creating their TAXSIM input variables.

The major deviation from Butrica and Burkhauser (1997) in this paper is the imputation of itemized deductions. The PSID does not contain the dollar value of total deductions. In fact, this variable is estimated in the calculation of the PSID tax data. Specifically, the PSID predicts (or, from 1984 on, actually asks) whether or not a tax unit itemized deductions in the previous year. Those predicted or observed to have itemized are assigned weighted-average deduction amounts for their income bracket, based on IRS Statistics of Income (SOI) reports. Butrica and Burkhauser (1997) note that the PSID no longer includes itemization status and, due to the inability to easily and accurately predict both itemization status and deduction amounts, assign every filer the standard deduction. They also note that this assumption causes most of the differences between their otherwise accurate TAXSIM tax variables and the PSID tax variables.

Since neither of these approaches provided the best prediction of tax rates and liabilities, and since itemization status is especially critical for workers contemplating a transition into self-employment, I used the Ernst & Young and University of Michigan Tax Research Database Individual Model Files to impute deductions for each tax unit. These yearly cross-sectional data files are random samples of unaudited tax returns compiled by the IRS Statistics of Income Division and processed at the University of Michigan's Office of Tax Policy Research (OTPR). Each file contains data from between 80,000 and 250,000 Form 1040, 1040A, and 1040EZ returns. With the exception of a small number of fields omitted to protect confidentiality, the files contain most of the information from each tax return as well as a number of other helpful variables created by the OTPR staff.

In the first step of the deduction imputation, all tax filers were divided into six groups based on filing status (single, married/joint, and head of household) and whether or not the return included a Schedule C. Next, a Tobit regression was estimated separately for each of the six types of filers and for each year from 1979 to 1991. The dependent variable for the Tobits was the total dollar value of itemized deductions. This variable took the value of zero for those filers claiming the standard deduction. Further, for 1979 through 1986, the filing status-specific zero bracket amount was added to the total deduction amount reported on the tax form. Independent variables in the Tobits consisted of adjusted gross income (entered as a quadratic), the total number of exemptions, and a series of dummy variables for state of residence.

Coefficients from the Tobits were then used to predict deduction amounts for individuals in the PSID, again based on filing and self-employment status. Since Schedule C status is not reported in the PSID, all individuals who were self-employed were assumed to have filed a Schedule C. Also, since the PSID does not include a measure of AGI, total family-unit money income was used as a proxy. This probably overestimates AGI and, consequently, total itemized deductions. However, as Table A.1 shows, my imputation actually understates itemization for PSID respondents. Butrica and Burkhauser (1997)–by assigning the standard deduction to all filers–more dramatically understates itemization, and the PSID probably overestimates itemization in the years when itemization status is unknown. Further, it should be noted that the rates in Table A.1 are calculated across all tax units, not the reduced sample of PSID household heads used in this study.

To calculate payroll tax rates and liabilities, I assumed that wage-and-salary employees were responsible for both the employee and employer shares. Tax payments were calculated by multiplying statutory rates by labor income up to the maximum taxable amount. Marginal payroll tax rates, therefore, are equal to the statutory rate below this amount and zero above this amount. Average tax rates for all taxes are calculated by dividing the total tax payments by total household money income, and are screened to be no greater than 100 percent in absolute value.

Appendix Table A.1: Predicted Itemization Rates Across All Tax Units in the PSID

Year	Itemization Rate (%)
1979	12.0
1980	11.4
1981	10.4
1982	10.3
1983	20.6
1984	14.1
1985	15.4
1986	13.3
1987	19.6
1988	14.4
1989	18.9
1990	19.1
1991	18.3