The Effect of Health Insurance Premium Subsidies on Entry into and Exit from Self-Employment

Bradley T. Heim*
Office of Tax Analysis
U.S. Department of Treasury

Ithai Z. Lurie**
Office of Tax Analysis
U.S. Department of Treasury

September 3, 2009

Abstract. This paper estimates the effect of an increase in the deductibility of health insurance premiums for self-employed individuals on the probability of being self-employed. Using a panel of tax returns from 1999 to 2004, we estimate fixed effects instrumental variable regressions for the probability of being self-employed, entering into self-employment, and exiting from self-employment. Our results suggest that this policy change increased the probability of being self-employed by 13%, and increased the probability that a taxpayer would be primarily or exclusively self-employed by 16% and 12% respectively. We also find that the probability of entering self-employment increased by 24% and the probability of exit decreased by 16%.

* Email: Bradley.Heim@do.treas.gov. Phone: 202-622-1316.
** Email: Ithai.Lurie@do.treas.gov. Phone: 202-622-1789.
Address: 1500 Pennsylvania Ave NW, Washington, DC 20220. The authors wish to thank Jon Bakija for providing his comprehensive tax calculator. We would also like to thank Tom Selden for providing us with state self-employed health deduction rules. The views expressed are those of the authors and are not necessarily those of the U.S. Department of the Treasury.

1. Introduction

Government authorities are often interested in policies that encourage the initiation and expansion of entrepreneurial activity, small businesses, and self-employment. New firms of these types are thought to be a source of innovation, as they try out new products, locations, and technologies, with possible spillovers if other firms can imitate their successes. As a result, these types of businesses are viewed as the engines of future growth in the economy. As evidence of this, the Small Business Administration reports that 60-80% of net new jobs are created by small businesses, and that small businesses create more than half of the non-farm private gross domestic product.[1]

However, when potential entrepreneurs are deciding whether to leave their job and strike out on their own, the cost of health insurance can be an important consideration, since leaving a job often carries with it the loss of employer sponsored health insurance. In addition, direct purchases of insurance while self-employed do not receive the same favorable tax treatment that is provided for purchases through an employer, and this differential treatment may decrease the likelihood that an individual would want to enter self-employment, or to remain self-employed, ultimately resulting in a lower level of entrepreneurship. This paper examines the extent to which making the cost of health insurance more favorable for the self-employed through changes in the tax code increases the level of self-employment in the United States.

In the United States, the after-tax cost of health insurance depends on whether the insurance is purchased through an employer or not for several reasons. First, purchases of employer-sponsored insurance (ESI) generally carry lower administrative costs due to

[1] See http://www.sba.gov/advo/stats/sbfaq.pdf.

lower expenditures on underwriting, advertising, and enrollment. Second, ESI premiums reflect greater risk pooling, which lower the variance of the medical claims and reduces the risk insurers face. Third, the types of policies available are often very different, with non-ESI policies generally providing less coverage and requiring larger out of pocket expenses. Finally, the tax treatment of ESI purchases is more favorable, since purchases through an employer are generally excluded from both payroll and income taxes, whereas purchases by the self-employed are not excluded from payroll taxes, and until 2003 were not fully deductible from income taxes.[2]

Beginning with Madrian (1994) who examined the effect of aspects of ESI on job turnover, a large literature has developed examining the effect that ESI has on various work margins. Gruber and Madrian (2002) provide a nice survey of this "job-lock" literature, and argue that there is consistent evidence that having health insurance affects retirement decisions and that being covered by spousal health insurance affects one's labor supply and labor force participation. However, the evidence on the effect of ESI on job turnover is more mixed, with papers comparing those with and without spousal coverage finding significant effects, while papers that compare individuals based on health status generally find insignificant effects.

Looking at self-employment specifically, Holtz-Eakin et al. (1996) find no statistically significant effect of the presence of a spousal ESI on entrance into self-employment using PSID data, though their point estimates suggest that spousal ESI may have a large effect. Subsequent work by Madrian and Lefgren (1998), Wellington (2001) and Gumus and Regan (2009) all find that spousal health insurance increases the

[2] Non-ESI purchases by taxpayers who are not self-employed are only deductible if the taxpayer itemizes deductions, and only to the extent that total health expenditures exceed 7.5% of AGI.

probability of being self-employed or entering self-employment. However, Fairlie et al. (2008) estimate difference-in-differences models of the transition from wage employment to self-employment, and finds mixed results similar to the job turnover literature discussed above – significant effects when comparing those with and without spousal coverage, and insignificant results when comparing individuals based on health status. He does find, however that those just above age 65, when individuals become eligible for Medicare, have significantly higher rates of self-employment than those just below age 65.

In recent years, policy changes have served to decrease the tax differential between employer sponsored health insurance and health insurance purchases by the self-employed. The Tax Reform Act of 1986 (TRA86) included a provision in which the self-employed could deduct 25% of health insurance premiums. More recently, legislative changes in 1998 increased the deductibility of health insurance premiums for self-employed individuals for federal income tax purposes from 60% in 1999 to 70% in 2002 and to 100% in 2003, and in effect reduced the price of health insurance while self-employed. A number of papers, including Gruber and Poterba (1994), Selden (2009), Heim and Lurie (Forthcoming), and Gumus and Regan (2008a) each examine the effect of a subset of these tax changes on the take-up of health insurance among the self-employed, and Heim and Lurie (Forthcoming) additionally examine whether the tax changes also increased the amount of insurance purchased.

The exogenous change in the cost of health insurance induced by these changes in tax policy also provides a natural experiment to assess the sensitivity of the self-employment decision to health insurance prices. Two working papers have examined the

effect of these tax policy changes on the propensity to be self-employed.[3] Velamuri (2008) uses CPS data to examine the effect of TRA86 on the decision of employed women to become self-employed, and finds that the rate of self-employment among women who were not covered under a spousal plan rose by between 14% and 25% after TRA86. Gumus and Regan (2009) also use CPS data, and find small effects of the 1997-2006 expansion of the self-employed health insurance deduction on entry, but no significant effects on exit from self-employed or the likelihood of being self-employed.[4]

This recent literature examining the effect of tax policy toward health insurance on rates of self-employment builds on a large literature examining whether marginal tax rates on income affects the level of self-employment. Since evasion of taxation on self-employment income may be easier than evasion of taxes on wage and salary income (because wages and salaries are generally reported to the Internal Revenue Service by one's employer), it is possible that more individuals become self employed when tax rates (and the payoff from tax evasion) are higher.[5] Several papers, including Long (1982), Moore (1983), Blau (1987), Parker (1996), and Schuetze (1998) find that higher marginal tax rates lead to self-employment. However, Fairlie and Meyer (1999) find that levels of self-employment are unrelated to marginal tax rates over the period 1910-90, and Moore (2003) examines TRA86 and OBRA93 and finds that neither of these tax

[3] Gurley-Calvez (2006), in a study for the Small Business Administration, uses a small sample of tax returns from 1988-90 to estimate the propensity to exit self-employment as a function of whether a self-employed taxpayer claimed the health insurance deduction. She does not, however, examine whether self-employment behavior changes when tax policy changes.

[4] On a related topic, DeCicca (2007) estimates the effect of an individual health insurance market reform in New Jersey in 1993 on the probability of being self-employed. The New Jersey reform included a large set of provisions which were intended to increase access to the individual health insurance market, including providing a set menu of policies, mandating guaranteed issue and renewability of policies, and pure community rating. DeCicca finds that the reform increased self-employment levels by 15% to 25% .

[5] For a survey of studies that have examined other determinants of self-employment in several countries, see Le (1999).

changes appeared to have a consistent significant effect on the self-employment decision. Gentry and Hubbard (2000) find that the level of marginal tax rates does not have a consistent effect on entry into self-employment, but that more progressive taxation tends to decrease entry into self-employment. In two papers, Bruce (2000, 2001) examines the response of entering into and exiting out of self-employment to differences in the tax rates that would be faced in wage work and self-employment, and finds that workers who switched into self-employment tended to be those who faced higher tax rates in self-employment than they would at a wage earning job.

It is important to note that the responsiveness of self-employment behavior to changes in the after-tax price of health insurance could take several forms. An employee of a firm that offers health insurance may decide to leave their wage and salary employment altogether to start an independent business when the increased deductibility of premiums lowers the cost of health insurance. A taxpayer that is partially self-employed and receives health insurance from their employer may decide to decrease or eliminate their wage employment, becoming primarily or exclusively self-employed with insurance purchased on their own. In addition, the lowered cost of health insurance may induce individuals to experiment with self-employment. A part-time worker who already purchases insurance in the individual market may decide to start up a side business, since any profits up to the cost of their health insurance policy are effectively exempt from income taxes. Or, a worker who is not covered by insurance may decide to start a small business, and also purchase health insurance because of the increased deduction.

This study, then, examines self-employment behavior using a panel of tax returns from over 236,000 taxpayers that spans 1999 to 2004. It advances the literature in at least

three ways. First, because it uses a panel in which the self-employed are followed for up to six years, it is possible to include fixed effects to account for unobserved characteristics that are correlated with the regressor of interest and outcome variables. Second, this paper examines whether the impact of the policy differs depending on the intensity of self-employment under examination (whether the taxpayer has at least a minimal amount of self-employment income, whether the majority of their income flows come from self-employment, or whether they are exclusively self-employed). Third, since the tax data reports whether the self-employed health insurance deduction was claimed, it is possible to test whether any responsiveness to the policy change is centered among those who actually claim the deduction, which would be expected if any estimated effect is indeed due to the policy change.

Using fixed effect instrumental variable models, we estimate the extent to which the level of self-employment is related to the after-tax price of health insurance. Our results suggest that the 6.0 percentage point decline in the tax price of health insurance while self-employed between 1999 and 2004 increased the probability of being self-employed by about 1.6 percentage points, or by 12.8%. We also find significant effects on different intensities of self-employment, with an increase in the probability that a taxpayer would be primarily or exclusively self-employed by 16.4% and 11.6% respectively. As would be expected, we find that this increase in the propensity to be self-employed is centered among those who claimed the self-employed health insurance deduction. We also find this decrease in price increased the probability of entering self-employment by 24.3% and decreased the probability of exiting self-employment by 16.3%.

The paper proceeds as follows. Section 2 describes tax policy toward health insurance for the self-employed. In Section 3, the estimation strategy is outlined, and Section 4 describes the panel of tax returns that is used in this study. Section 5 presents the estimation results, and Section 6 concludes.

2. Tax Policy Toward Self-Employed Health Insurance

The federal deduction for self-employed health insurance originated as part of the Tax Reform Act of 1986 (TRA86). Prior to TRA86, the self-employed could deduct health insurance premiums only if they itemized deductions and only to the extent that total health expenditures exceeded 7.5% of their AGI. The passage of TRA86 allowed the self-employed to deduct 25% of their premiums from income prior to the calculation of adjusted gross income (AGI) starting in 1987 regardless of whether they itemized deductions. Self-employed taxpayers are eligible to take the deduction if they have a net profit from self-employment[6] and they (and their spouse) are not eligible to participate in an ESI plan. The self-employed health insurance deduction is limited to net earnings from self-employment less contributions to retirement accounts and half of self-employment taxes, in effect preventing self-employment taxable income from being negative.

Originally, under TRA86 the deduction was temporary and was set to expire in 1992. However, the federal tax code was amended several times to extend and increase the deductibility of premiums, with the rate increasing from 25% in 1987-1995, to 30% in 1996, 40% in 1997 and 45% in 1998. The Omnibus Consolidated and Emergency

[6] Shareholders of more than 2% in S corp. that receive wages are also eligible for the deduction.

Supplemental Appropriations Act of 1998 (OCESA) accelerated the increase in the deductibility of health insurance premiums further and set it at 60% from 1999 until 2001, 70% in 2002 and 100% thereafter.

During the period under analysis, states also changed the fraction of self-employed health insurance premiums that are deductible for state income tax purposes. In 1999 there were 3 states that did not allow the self-employed to deduct premiums at all, 4 states had deductions that ranged from 40% to 70%, 26 states that matched the federal deduction, 9 states that allowed the full premiums to be deducted from income for tax purposes and 9 states that did not have an income tax. By 2004, only 2 states did not allow the deduction and 40 states allowed the self-employed to deduct 100% of premiums, which matched the federal rates (9 states still did not have an income tax).

In our estimation, the identifying variation comes from both the federal and state changes in the deductibility of health insurance for the self-employed. Figure 1 illustrates the variation in the after-tax price of purchasing health insurance for the self-employed (defined in the next section) across states, time, and income levels during the years of our sample.[7] In this figure, we trace out, for eight different tax units, the tax prices in each year of our sample. For this, we calculated the tax prices for a married couple filing jointly, who report either $30,000 or $60,000 in taxable income, and who live in one of four states (Florida, Indiana, Illinois, or New York). In this figure, the couples earning $30,000 have higher tax prices than those earning $60,000 regardless of the state of residence, and within each group of couples earning the same amount there is considerable variation in tax prices within a year and across time.

Looking at the tax prices for couples reporting $30,000 in taxable income, the

[7] This figure and discussion draws heavily from Heim and Lurie (Forthcoming).

couple living in Florida (which does not have an income tax, and so self-employed health insurance expenses are not deductible at the state level) faces the highest tax price and the smallest decline in price across years. Looking at the other states, in 1999 the couple in Illinois has a tax price only slightly higher than that of the couple in New York and lower than the couple in Indiana, since the couple in Illinois is able to fully deduct self-employed health insurance expenses at the state level, while the couples in the other two states (whose state marginal tax rates are higher than the rate in Illinois) can only deduct 60%. By 2004, both New York and Indiana increased the fraction deductible to 100%, and so the tax price for the couple in Illinois is higher than the prices for the Indiana and New York couples. The declines in relative prices for these couples between 1999 and 2004 ranges from 6.6 percent for the Florida couple to 9.6 percent for the New York couple. Similar patterns are found for the couples reporting $60,000 in taxable income: the couple in Florida faces the highest prices and smallest declines, the couple in New York experiences the largest declines, and the couple in Illinois faces a relatively smaller drop in price than couples in New York and Indiana. The declines in tax prices for couples reporting $60,000 in taxable income range from 9.9 percent to 13.8 percent.

3. Estimation Strategy

Our estimation of the effect of the increase in the deductibility of self-employed health insurance premiums on the probability of being self-employed expands on the methods used in some previous papers that examined the effect of the price of health insurance on the decision to purchase health insurance, or the effect of taxes on the

decision to be self-employed. We assume that the decision to be self-employed is a function of the price of health insurance if self-employed (in which premiums are partially or fully deductible), the price of health insurance if the taxpayer is a wage and salary worker (in which health insurance premiums are excludable from income), the after-tax share of income, and other control variables.

Hence, the decision to be self-employed can be represented by the following equation:

(1) $$SE_{it} = P^{SE}_{it}\,\alpha_1 + P^{WS}_{it}\,\alpha_2 + T_{it}\,\alpha_3 + X_{it}\beta_1 + V_i + \varepsilon_{1it,}$$

where SE_{it} is one if the taxpayer is self-employed and zero otherwise, P^{SE}_{it} is the after tax price of health insurance when self-employed, P^{WS}_{it} is the after tax price of health insurance for a wage or salary worker employed by a firm, T_{it} is the net of tax share (defined as one minus the individual's marginal tax rate), X_{it} is a vector of characteristics of the self-employed characteristics that vary over time, V_i is a vector of characteristics that do not vary over time, and ε_{it} is the error term.

The main covariates of interest are the prices of health insurance when self-employed or employed by a firm, and the net of tax share. One would expect $\alpha_1<0$, $\alpha_2>0$, and α_3 could be either positive or negative, given the previous literature.

To derive the after-tax price of purchasing health insurance when self-employed, consider a pre-tax dollar that is spent on health insurance. After taxes, this purchase will cost the self-employed individual a dollar minus the amount they will save in taxes. On their federal return, they will be able to deduct a share, θ_f, which will save them $\theta_f\,\tau_f$ in federal income taxes, where τ_f denotes their federal marginal tax rate. In addition, they will be able to deduct a share, θ_s, on their state tax return which will save them $\theta_s\,\tau_s$ in

state income taxes, where τ_s denotes their state marginal tax rate. If they itemize deductions and their state income taxes go down, however, their federal taxes will increase by $\theta_s \tau_s \tau_f$, which is the amount of the decreased deduction multiplied by their federal marginal tax rate. Taken together, the after-tax price is given by (omitting the individual and year subscripts):

(2) $$P^{SE} = 1 - \theta_f \tau_f - \theta_s \tau_s + (\theta_s \tau_s \tau_f) * item$$

For wage and salary workers, the after-tax price of purchasing health insurance depends on whether the premium dollar is paid by the employer or the employee. Let γ denote the share of the health insurance premium paid by the employee,[8] and let $(1-\gamma)$ denote the employer's share. For the employer's share, because health insurance premiums are exempt from payroll taxes, the employer could purchase $(1+\tau_p)$ in health insurance – where τ_p is the marginal payroll tax rate – for the cost of a dollar in pre-tax wages, which would reduce the employee's after tax income by $1-\tau_f - \tau_s + (\tau_s \tau_f) * item - \tau_p$. Thus, the after-tax cost of a dollar of health insurance purchased by the employer is the latter term divided by the former.

For the employee's share, for taxpayers ineligible to receive the Earned Income Tax Credit (EITC), the after-tax price of a dollar of health insurance is the same as the price for the employer's share (assuming they have a cafeteria plan, which most employers do). For EITC recipients, however, the tax treatment was slightly different prior to 2002. In these years, employee paid health insurance premiums were counted as

[8] We set γ at 23.8% for head of household filers and married taxpayers filing jointly, and 17.5% for single filers, which is the average employee contribution share in the Medical Expenditure Panel Survey between 1999 and 2004.

income for EITC purposes.[9] So, a dollar of pre-tax income used for health insurance would still be exempt from payroll tax and the employee could purchase $(1+\tau_p)$ in health insurance, but that $(1+\tau_p)$ would be counted toward EITC income and so would yield $(1+\tau_p)(1-\tau_f^{EITC}-\tau_s^{EITC})$ in health insurance net of the EITC, where τ_f^{EITC} and τ_s^{EITC} are the state and federal marginal EITC rates. Altogether, the after-tax price of purchasing health insurance for wage and salary workers is given by

(3)

$$P^{WS} = \begin{cases} \gamma\left[\left(1-\tau_f-\tau_s+\tau_f\tau_s item-\tau_p\right)/\left(1+\tau_p\right)\left(1-\tau_f^{EITC}-\tau_s^{EITC}\right)\right] & \\ +\left(1-\gamma\right)\left[\left(1-\tau_f-\tau_s+\tau_f\tau_s item-\tau_p\right)/\left(1+\tau_p\right)\right] & if \quad year<2002 \\ \left(1-\tau_f-\tau_s+\tau_f\tau_s item-\tau_p\right)/\left(1+\tau_p\right) & if \quad year\geq 2002 \end{cases}$$

Finally, the net of tax share is given by

(4) $T = 1-\tau_f-\tau_s+(\tau_s\tau_f)*item$

This represents the additional amount of after-tax income an individual would receive if they earned an additional dollar of income.

During our time period, payroll tax rates did not change, and hence separate variation in P^{WS}_{it} and T_{it} comes solely from the change in the treatment of health insurance premiums for the EITC. Since these two variables are almost perfectly collinear as a result, we omit T_{it} from the estimation equation, and estimate:

(5) $SE_{it} = P^{SE}_{it}\alpha_1 + P^{WS}_{it}\alpha_2 + X_{it}\beta_1 + V_i + \varepsilon_{1it,}$

[9] Before 2002, the EITC was based on total compensation, and so switching wages to health insurance contributions did not impact a taxpayer's EITC. From 2002 forward, the EITC is based on wages and salaries exclusive of health insurance premiums. As such, switching wages to health insurance would decrease the taxpayer's EITC in the phase-in range of the credit or increase it in the phase-out range.

In this specification, α_2 captures the direct effect of taxes on self-employment through reducing the after tax share of income, as well as the indirect effect through the price of employer provided health insurance, and its sign is indeterminate.

We also examine whether changes in the probability of being self-employed resulted from changes in rates of entrance into or exit from self-employment. To do so, we estimate

(6) $$Enter_{it} = P^{SE}_{it}\,\alpha_1 + P^{WS}_{it}\,\alpha_2 + X_{it}\beta_1 + V_i + \varepsilon_{1it,}$$

where $Enter_{it}$ equals one if the taxpayer was not self-employed in *t-1* but was self-employed in *t*, and

(7) $$Exit_{it} = P^{SE}_{it}\,\alpha_1 + P^{WS}_{it}\,\alpha_2 + X_{it}\beta_1 + V_i + \varepsilon_{1it,}$$

where $Exit_{it}$ equals one if the taxpayer was self-employed in *t-1* but was not self-employed in *t*.

In these specifications, one source of variation in the price of health insurance while self-employed comes from the changes in deductibility of self-employment premiums (θ_f and θ_s) which provides variation over time. A second source of variation is cross-sectional which is due to the differences in the after tax prices of health insurance between households. The main concern with using cross-sectional variation between households to identify the price effect is that differences in household characteristics will be correlated both with the price of insurance and with the propensity to be self-employed.[10] Hence, omitting any unobserved characteristics can lead to biased estimates.

The panel structure of our data enables us to bypass this problem by including fixed effects. Including fixed effects differences away the household characteristics that

[10] For example, taxpayers who are less risk averse might be more likely to be self-employed, and also to be more aggressive in engaging in tax avoidance and evasion, which would tend to decrease the after tax prices of health insurance, biasing the estimated coefficient toward zero or postive.

are correlated with the price of insurance and propensity to be self-employed, and enables us to better control for household's characteristics that are correlated with both the price of health insurance and the likelihood of self-employment. Because changes in filing status or the presence of children may be correlated with both changes in the tax prices of self-employed and wage and salary health insurance, and correlated with the propensity to be self-employed,[11] we include fixed effects at the taxpayer-filing status-presence of children level. Thus, a taxpayer who changes filing status or for whom the presence of children changes is treated as a separate observation after the change.

Since the tax prices are endogenous to whether and how much self-employment income the taxpayer earned, we instrument for both health insurance tax prices. For the instrument, we calculate synthetic prices that are calculated by replacing the taxpayer's actual marginal tax rate in each year with the marginal tax rate they would have faced given their income, deductions, and take-up choices in the first year the taxpayer is observed in the panel with a particular filing status and presence of children combination.[12] Thus, changes in the synthetic prices across years are driven solely by differences in the tax law across years, and not differences in taxpayer's income and employment behavior. As a specification check, we also create an alternative instrument by using the income and deduction variables from two years prior to the observation to calculate the marginal tax rates that enter into the synthetic tax price.[13] However, the partial R^2 and the *t*-statistics on the excluded instruments in the SEHI tax price first stage

[11] For example, a single taxpayer may be less risk averse, while a taxpayer with children may be more risk averse.
[12] Observations from the first year a taxpayer is observed with a particular filing and presence of children status are dropped from the regression, as no instrument can be calculated for these observations.
[13] In this specification, the first two years that a taxpayer is observed with a particular filing and presence of children status are omitted from the regression. We also tried a specification in which prior year's income was used to calculate the instruments, but the results were wrongly signed.

regression suggested that the instrument calculated using the first year's income and deduction variables performed best, and so that instrument is used in our base specification.

The X_{it} vector includes the following information that is gathered on the tax return: total income, age of primary filer, age squared, the number of children reported on the tax return, and the filing status (single, married filing jointly, head of household, qualified widower)[14]. Also included in X_{it} is a set of year dummies to control for factors that vary over time but do not vary across households, including nationwide trends in the cost and availability of individual and group health insurance and the general level of the macroeconomy.

5. The 1999-2004 Edited Panel of Tax Returns

The data used in this study come from a six year panel of tax returns known as the 1999-2004 Edited Panel.[15] This dataset has several advantages over previously used publicly available datasets like the CPS. First, the sample is quite large, including a large number of self-employed and a large number of transitions into and from self-employment. Second, taxpayers are followed up to six years, and so it is possible to include fixed effects and identify the effect of tax changes using within taxpayer changes in employment (and entry or exit) status. Third, since we observe the amounts of self-employment and wage and salary income reported on the tax form, we can examine response both on the decision of whether or not to earn any self-employment income and

[14] We exclude taxpayers who are married filing separately, as we do not observe the self-employment status of such a taxpayer's spouse.
[15] For more information on the 1999 Edited Panel, see Weber and Bryant (2005).

on the decision to be primarily or exclusively self-employed. Fourth, since we observe whether the self-employed health insurance deduction was claimed, we can better infer whether an employment transition was due to the change in deductibility. If the increased deduction induced someone to become self-employed, they should be more likely to take the deduction, and so any effect of the change in deductibility should primarily be found among those taking the deduction. On the other hand, tax data includes limited demographic characteristics, and it is not possible to observe health insurance coverage for those who do not take the self-employed health insurance deduction. However, the inclusion of individual and year fixed effects helps to control for these.

For the estimation, we cut the panel down to the Continuous Work History Subsample (CWHS), which consists of a random sample of taxpayers for which the primary filer's social security number ended in one of five four-digit combinations. Over the six years, the CWHS sample consists of 335,902 returns from 63,320 different taxpayers. Of these taxpayers, 74% are in the sample all six years. The sample was cut to include only returns where both taxpayers (primary and secondary) are aged 25 to 64, to focus on individuals in their prime working years, leaving us with a sample of 236,878 returns form 48,396 different taxpayers.

We define total self-employment income by summing income from sole proprietorships and farms (from Form 1040), with income from partnerships and subchapter S corporations (from Schedule E). These variables are only available at the household level in the tax data, and so the tax filing unit (a single individual for those filing singly, head of household, or widowed, and a married couple for those married

filing jointly)[16] forms our unit of analysis in our main specification.

Self-employment income reported on Schedule SE (which includes income from sole proprietorships, farms, and partnerships, so long as it exceeds a small positive threshold) is available at the individual level, however. The downside of using this variable is that it does not include losses from self-employment, nor does it include S corporation income. As a result, if a taxpayer has a business that goes from losses to positive earnings from one year to the next, he would be considered not self-employed the first year by the Schedule SE definition, self-employed the second year, and an entry would be considered to have occurred between the two years. Such measurement error in self-employment status and transitions between states may bias the results somewhat. Nevertheless, we use Schedule SE income to define our dependent variable in some specifications as a robustness check and as a way to examine self-employment behavior at the individual level.

Given that individuals may earn wages or a salary from a firm at the same time that they earn income from self-employment, there is no clear cut definition of what it is to be "self-employed." Because of this, for our dependent variables we define three indicators for the level or intensity of self-employment based on total self-employment and total wage and salary income at the tax unit level. For the first definition, the return must report more than $5,000 (deflated to 2000 $) in absolute value in income or loss from self-employment.[17] This variable is meant to capture all types of self-employment, including those who are just experimenting with self-employment, and those for whom the primary earner earns a salary but a secondary earner has some self-employment

[16] We cut from the sample taxpayers who are married but file separately.
[17] We also tried thresholds of $0, $10,000, and $20,000. The results were qualitatively similar.

activity. For the second definition, the return must report more than $5,000 (in absolute value) in self-employment income or loss, and the majority of the income flows of the tax unit must come from self-employment.[18] This variable will capture those for whom self-employment is their major income earning activity, including those for primary earning spouse is self-employed while the other spouse holds a wage and salary job. For the third, the return must report more than $5,000 (in absolute value) in self-employment income or loss, and report no wage and salary income. This variable captures only those who are exclusively self-employed, where no income in the household comes from wage employment.

To examine whether, as would be expected, any estimated effects of the increased self-employed health insurance deduction are centered among those who claim the deduction, we also use the interaction between the self-employed variable and a dummy variable for claiming the self-employed health insurance deduction as a dependent variable. Information on whether the taxpayer claimed the self-employed health insurance deduction comes from the relevant line on the taxpayer's Form 1040.[19]

To examine the entry and exit decision, we define variables for entry into and exit from each of the types of self-employment above. We define entry as not being self-employed (at a particular level of self-employment) in year *t-1*, but being self-employed in year *t*. Similarly, we define exit as being self-employed (at a particular level) in year *t-1*, but not in year *t*.

To calculate the tax prices of self-employed health insurance and health insurance of wage and salary workers described above, four items need to be calculated for each

[18] Formally, the absolute value of self-employment income must exceed one half of the sum of the wages and salaries and the absolute value of self-employment income.
[19] Line 28 in 1999-2001, line 30 in 2002, and line 29 in 2003-2004.

taxpayer in the sample: federal and state marginal tax rates, the marginal payroll tax rate, and the marginal EITC rate. These marginal tax rates were calculated using tax calculators provided by Jon Bakija[20] by incrementing the relevant variable (income or adjustments to income) by $100 and calculating the marginal change in taxes owed. Using the resulting marginal tax rates, and information on whether the taxpayer itemized or not, the health insurance tax prices were calculated using equations (2) and (3).

To control for other characteristics of the taxpayers in the panel, information is used on the primary filer's age and the tax unit total income, number of children, and filing status. Since there are a large number of extreme ouliers for the total income variables, and since total income may be either positive or negative, we include the inverse hyperbolic sine (IHS) transformation of income[21] in the regression. In addition, the effect of income may differ depending on the level of income. For example, if increases in income at higher income levels induced increasing self-employment at the same time that the tax price for these households was decreasing, failure to properly account for these income trends at higher levels may lead to upwardly biased estimates of the tax price coefficient. To account for this, in our base specification, we include a ten-piece spline in IHS transformed total income.

Sample statistics for all variables are presented in Table 1. The first three rows show the means and standard deviations of the probability of being self-employed based on the three intensity levels of self-employment. In the sample, 13.6% of filers have self-employment income in excess of $5,000 in absolute value. Those for whom a majority of earned income came from self-employment make up 7.2% of the sample, while 4.0% of

[20] Documentation for these tax calculators is detailed in Bakija (2008).
[21] This transformation takes the form IHS(y) = log(y + sqrt(y^2 + 1)). See Burbidge, Magee and Robb (1988).

the sample is exclusively self-employed. The next two rows decompose the first type of self-employment into returns that take the health insurance deduction (3.3%) and those that do not (10.3%). The next six rows show that the probability of leaving self-employment conditional on being self-employed in the previous period is between 20.0% and 22.4%, while the probability of entry into self-employment decreases from 4.0% for earning any amount of self-employment income to about 1.1% for becoming exclusively self-employed.

The mean tax price of health insurance for wage and salary workers (hereafter denoted WSHI Tax Price) and mean tax price of health insurance for the self-employed (denoted SEHI Tax Price) are 0.682 and 0.859 respectively. Slightly over a third of the sample is single, with married taxpayers filing jointly comprising 48.1% of the sample, and the rest divided between head of household and widow. The average age of the primary filer in the sample is 43 years old.

Trends in the level of self-employment (by the three different intensities of self-employment) and the tax prices of health insurance between 1999 and 2004 are presented in Figure 2. In Panel (a), the probability of being self-employed shows relatively constant growth throughout the period for all three intensities of self-employment. Overall, the rates of self-employment (in absolute value) for each of the three levels of self-employment increased by 16-20% from 1999 to 2004: those with above $5,000 in self-employment income increased from 12.5% to 15%, those with a majority of earned income from self-employment increased from 6.7% to 7.9%, and those with exclusively self-employment income increased from 3.7% to 4.3%.

In Panel (b), the mean SEHI tax price decreased each year between 1999 and 2002,

declined substantially in 2003 and stayed roughly constant in 2004. This tax price was affected both by the increases in the deductibility of health insurance premiums for the self-employed (which would tend to decrease the tax price), and by the tax rate cuts passed in the Economic Growth and Tax Relief Reconciliation Act of 2001 and the Jobs and Growth Tax Relief Reconciliation Act of 2003 (which would tend to increase the tax price). The WSHI tax price was affected only by 2001 and 2003 tax cuts, and so the mean of this variable had somewhat of an increasing trend throughout the period. This graph, then, provides some suggestive evidence that the tax prices of health insurance and the rate of self-employment are related. The tax price of health insurance while self-employed decreased while the rate of self-employment was increasing, suggesting that the two might be negatively related. Similarly, the tax price of health insurance while employed by a firm increased, suggesting that it might positively be related to the level of self-employment. However, the trends in self-employment are likely to be driven by many other factors, including the overall state of the macroeconomy. Thus, we next turn to a regression analysis to examine whether the relationship between these tax prices and levels of self-employment holds up under a more stringent identification strategy.

6. Results

The first column of Table 2 presents fixed effects instrumental variables regression results for the probability of having more than $5,000 (in absolute value) in total self-

employment income.[22] In subsequent tables, we present estimates the effect of the decrease in the price of health insurance on the other modes of self-employment, including earning a majority of income from self-employment and being exclusively self-employed. The specification in Table 2, then, will capture the effect of the decrease in the price of health insurance while self-employed on the decision to experiment with self-employment. The coefficients from the related first stage regressions are presented in Appendix Table 1.

The coefficient on the SEHI tax price is -0.267 (with a standard error of 0.057), which is statistically significant and of the correct sign (an increase in the tax price of health insurance while self-employed will reduce the incentive to be self-employed). Given that the tax price for self-employed health insurance declined by 0.06 between 1999 and 2004, this coefficient would suggest a 1.6 percentage point increase in the probability of being self-employed ((-0.267)*(-0.06)) or a 12.8% increase in self-employment (1.6% divided by 12.5%, which is the 1999 probability of being self-employed). The coefficient on the WSHI tax price is 0.014 and insignificant. Recall that the WSHI tax price embodies two effects. First, an increase in WSHI tax price will induce individuals to become self-employed because the relative cost of health insurance for the self-employed goes down. Second, an increase in the WSHI tax price would suggest lower tax rates per se, which may decrease the incentive to be self-employed because the ability to shelter income from taxation declines. Hence, the expected sign of the coefficient is undetermined.

[22] The first stage results, coefficients on all covariates from the second stage, and tests for weak instruments (including the partial R-squared of the instruments in the first stage equation and the F test statistic and the related p-value from a test that the coefficients on all instruments are zero) are presented in Appendix Table 1. As noted in Staiger and Stock (1997), F test statistics above 10 are preferable to avoid weak instrument concerns, and the F test statistics for both first stage regressions are well in excess of 10.

Columns 2 through 7 present a number of robustness checks of the results from the base specification. To examine the effect of controlling flexibly for income by including a ten piece spline in IHS transformed total income, in Column 2 we replace the spline with IHS transformed total income. The coefficient on the SEHI tax price increases slightly in this specification to -0.344, suggesting that controlling flexibly for income decreases the estimated effect of the increased deduction somewhat, though the estimated coefficient is not significantly different from that in the base specification.

In Column 4, we use an alternative instrument for the SEHI and WSHI tax prices, in which synthetic tax prices are imputed using marginal tax rates calculated by taking twice lagged income and deduction variables inflated to the observation year's level. As noted above, specification tests suggested that the instrument used in the base specification is preferred to this one. Nevertheless, the resulting estimated coefficient on the SEHI tax price, -0.423, is larger than in the base specification, but the standard error is substantially larger as well.

One may still be concerned that, since federal tax law changes drive a large portion of the variation in the SEHI tax price, if trends in self-employment vary by income group, even controlling for a spline in income may not be sufficient to properly control for income. If self-employment rates increased more for high income taxpayers, it is possible that the SEHI tax price variable is still picking up the differential trends in self-employment for high income versus other income groups. To allow income to have different effects by year for each income decile, in Column 4 we include year specific ten piece splines in total income. The resulting coefficient is -0.319, and is insignificantly different from the base specification.

One may also be concerned that our tax price variables represent the after tax price of purchasing a nominal dollar of health insurance, and that the real value of a nominal dollar of health insurance changed over the sample period. To account for this, in Column 5, we deflated both the SEHI tax price and the WSHI tax price by the medical CPI to year 2000 values. This also has only a small effect on the estimated coefficient on the SEHI tax price, increasing it to -0.336.

Finally, to examine the extent to which including individual and year fixed effects in the estimating equation has on the effect of the SEHI tax price, in Column (6) and (7) we omit individual and year fixed effects, in turn. In Column (6), when individual fixed effects are omitted, the coefficient on the SEHI tax price is wrongly signed and highly significant, suggesting that some unobserved characteristics of taxpayers (for example, lower risk aversion) are positively correlated with the SEHI tax price and the propensity to be self-employed. This result suggests the importance of utilizing panel data and being able to control for individual fixed effects in our estimation. When year dummies are excluded in Column 7, however, the estimated coefficient is only slightly different from the base specification.

Taken as a whole, these specification checks suggest that the results in base specification are quite robust along a number of different dimensions.

Table 3 presents estimates from specifications that examine the modes of self-employment that are induced by the decrease in the after tax price of health insurance while self-employed. For comparison, Column 1 repeats the results from the base specification in Table 2.

In Column 2, the dependent variable is an indicator variable for self-employed income comprising a majority of the tax unit's earned income. This specification will capture taxpayers switching between no self-employment and receiving a majority of income from self-employment, and will also capture taxpayers switching between experimenting with self-employment and having self-employment income comprise the majority of earned income. So, if the only effect of the tax policy change was for taxpayers to switch between no self-employment and experimenting with self-employment, the coefficient in this column should be insignificant. The coefficient in this column, however, is estimated to be a highly significant -0.191 (with a standard error of 0.043), implying that taxpayers also responded to the tax change by increasing the intensity of self-employment. This coefficient implies that the 0.06 decline in the after-tax price of health insurance while self-employed led to a 1.1 percentage point (or a 16.4%) increase in the probability of having the majority of income coming from self-employment.

In Column 3, the dependent variable is an indicator for the tax unit being exclusively self-employed.[23] This specification will capture taxpayers switching between no self-employment and exclusive self-employment (for example, by leaving a wage and salary job and starting a full-time business), but will also capture taxpayers switching between intermediate levels of self-employment (experimenting with self-employment, or receiving a majority of income from self-employment but still earning wages) and exclusive self-employment. As a result, this specification will reflect whether taxpayers responded to the decrease in the price of health insurance by being more likely to have

[23] That is, the tax unit reports self-employment income in excess of $5,000 (in absolute value) and no wage and salary income.

self-employment as their sole source of income. The coefficient in this column is a significant -0.071, and the estimated coefficient implies that the 0.06 decline in the after-tax price of health insurance while self-employed led to a 0.43 percentage point (or a 11.6%) increase in the probability of being exclusively self-employed.

The results in these columns suggest that the increased deductibility of health insurance increased the probability of self-employment overall. However, if taxpayers were indeed increasing levels of self-employment because of the increased deduction, one would expect that the increase in self-employment would come among those who are self-employed and claim the self-employed health insurance deduction. To examine whether this is the case, in Columns 4 and 5 we interact the indicator variable for earning any self-employment income with a dummy variable for claiming the self-employed health insurance deduction. We then estimate the effect of the tax prices on the probability of being self-employed and claiming the health insurance deduction (in Column 4), and on being self-employed but not claiming the health insurance deduction (in Column 5).

In Column 4, the coefficient on the SEHI tax price is highly significant and correctly signed, with an estimated coefficient of -0.198. Although this coefficient is suggestive that individuals who become self-employed were more likely to purchase health insurance and/or individuals who exited self-employment were less likely to have had health insurance, it could also reflect individuals who were self-employed the entire period being more likely to purchase health insurance.[24] If only the latter of these were true, however, we would expect the coefficient in Column 5 to be positive and

[24] Indeed, Heim and Lurie (2008) find significant, but modest, effects on the takeup of health insurance among the continuously self-employed during this period.

significant. Since the estimated coefficient in Column 5 is estimated to be small and insignificant, it appears that an increased propensity to be self-employed and claim the health insurance deduction is indeed driving the results in the first column, and that the estimated increases in self-employment are due to the change in tax policy toward self-employed health insurance.

To examine the extent to which the increase in the probability of being self-employed is induced by entry into self-employment and/or exit from self-employment, Table 4 presents fixed effects instrumental variables regression results for the probability of becoming self-employed conditional on not being self-employed in the previous period, and Table 5 presents instrumental variable regression results for the probability of exiting from self-employment conditional on being self-employed in the previous period. Similar to Table 3 , the first three columns of these tables show results based on different levels of being self-employed (some self-employment income, self-employment income comprising the majority of earned income, and exclusively self-employment income) and the last two decompose the lowest level of self-employment into entry (or exit) with health insurance and entry (or exit) without.

Looking first at Column 1 of these tables (the some self-employment income columns), the coefficient on the SEHI tax price is -0.146 (with a standard error of 0.053) in the entry specification, which is statistically significant and of the correct sign. Given the decline in the SEHI tax price of -0.058 for the taxpayers who could potentially enter between 2000 and 2004,[25] this coefficient implies an increase of 0.85 percentage points in the probability of entering self-employment, or a 24.3% increase in the rate of entrance into self-employment. The coefficient on the SEHI tax price in the corresponding exit

[25] In other words, those who were not self-employed in the previous year.

specification is correctly signed and significant, with a coefficient of 0.608 (and a standard error of .286). The decline in the SEHI tax price among those who could potentially exit between 2000 and 2004 was -0.052, so this coefficient implies a decrease of 3.2 percentage points (or 16.3%) in the probability of exit from self employment. Thus, it appears that the decrease in the tax price of health insurance both significantly increased entry into self-employment and significantly decreased exit from self-employment.

For the other two intensities of self-employment (majority self-employment income and exclusively self-employment income) in the entry specifications, the coefficient in the majority self-employment income specification is correctly signed and significant, but the coefficient in the exclusively self-employed specification is incorrectly signed and insignificant. In the exit specification, on the other hand, estimated coefficients are correctly signed but insignificant due to large standard errors. Taken together, these results suggest that the decrease in the SEHI tax price tended to increase the number of tax units with a majority of income coming from self-employment by increasing the entrance rate into self-employment (though the exit rate may have decreased as well.) The source of the increase in the exclusively self-employed, on the other hand, is not clear, but likely came from decreased exits from exclusive self-employment.

Finally, Columns 4 and 5 of these tables examine the interaction between entering (or exiting) self-employment (defined as having some self-employment income), and dummies for claiming (or not claiming) the SEHI deduction.[26] In both the entry and exit

[26] Entry in this specification is defined as not being self-employed in *t-1*, and being self-employed and claiming (Column 4) or not claiming (Column 5) the self-employed health insurance deduction in *t*. Exit is

tables, similar to the analogous column in Table 3, the coefficient of the SEHI tax price is significant only for entry into (or exit from) self-employment coupled with claiming the self-employed health insurance deduction, which suggests that the estimated effect on entrance into and exit from self-employment was due to the health insurance deduction.

Table 6 assesses whether the results differ by age, presence of children, and income. For this table, we only present coefficients on the SEHI tax price variable. The first column presents results from regressions where the dependent variable denotes the tax unit reporting more than $5,000 (in absolute value) in self-employment income, and the second and third columns interact this with a dummy for having claimed the SEHI deduction. The next column presents results from the entry regressions, and the last column presents results from the exit regressions. Each cell represents the coefficient from a separate regression.

In the first three rows, observations were split according to whether the primary taxpayer was 25 to 39, 40 to 54, or 55 to 64. The estimated coefficient on the SEHI tax price is correctly signed and significant among all three groups (though only marginally significant for the young), while the interaction between being self-employed and taking the self-employed health insurance deduction is only significant for the middle group. Coupled with the marginally significant result for the middle group in the exit regression, these results suggest that the policy had the largest effect on self-employment of the middle age group by decreasing the rate of exit from self-employment for this group

In the next two rows of Table 6, observations were split according to whether children were reported on the tax return. From these rows, it appears that taxpayers with

---

defined as being self-employed and claiming (Column 4) or not claiming (Column 5) the deduction in *t-1* and not being self-employed in *t*.

and without children had similar responsiveness to the change in the deductibility of self-employed health. The estimated coefficient of -0.281 for those with no children implies a 1.8 percentage point increase in self-employment, while the coefficient of -0.308 implying a 1.7 percentage point increase for those with children. Significant effects were also found for both groups when being self-employed was interacted with taking the SEHI deduction, for entry into self-employment for the with children group and exit for the no children group.

In the final two rows of Table 6, the sample was split according to whether the taxpayer had high or low income, with high income defined as reported total income being above the top of the 15% tax bracket[27] in all years observed in the panel. In these specifications, a highly significant effect on self-employment is found for the high income group, with a smaller and marginally significant effect found for the low income group. The estimated coefficients imply a 5.0 percentage point increase for the high income group, compared to a 0.7 percentage point increase for the low income group. When being self-employed is interacted with claiming the deduction, highly significant effects are found for both groups, and the coefficient for the high income group is only slightly larger than that for the low income group, suggesting that much of the effect found above for the high income group could be spurious. Finally, significant results are found for both groups in the entry specification, suggesting that the prospect of lower after-tax costs of health insurance was a draw for both groups into self-employment.

[27] In 2000, this amount was $26,250 for single filers, $43,850 for married filing jointly, and $35,150 for heads of households.

Table 7 examines the extent to which responsiveness to the increased self-employed health insurance deduction varies by marital status and gender. The top row repeats the results from the base specification for comparison.

As noted above, the self-employment income variable used in the bulk of this study is only available at the tax unit level. In order to examine behavior at the individual level, the definitions of self-employment must be created using self-employment income from Schedule SE. To examine whether changing to a Schedule SE income-based definition of self-employment changes the results markedly, in the second row, we create variables denoting being self-employed, entering self-employment, and exiting self-employment by using Schedule SE income, and rerun the regressions at the tax unit level. From this row, it appears that using Schedule SE income dampens the estimated effects of the increased deduction somewhat, with the coefficient on being self-employed decreasing to -0.192 (compared to -0.267 in the base specification). Thus, it appears that using Schedule SE to define self-employment results in slightly downward biased estimates, which should be kept in mind in the results that follow.

In Rows 3 and 4, we cut the sample to include only single males and single females, respectively. From the first column, it appears that single males responded somewhat more strongly to the increased deduction, since their highly significant coefficient of -0.287 exceeds the insignificant coefficient of -0.112 for females. On the other hand, when being self-employed is interacted with taking the deduction, the estimated coefficients are significant for both groups and the magnitudes are closer, with coefficients of -0.187 for single males and -0.116 for single females.

Rows 5 and 6 cut the sample to include only married males and married females, respectively. Here, there is a clear difference by gender. The coefficient for married males is a highly significant -0.190 (and the interaction with taking the deduction is highly significant as well), whereas for married females the coefficient is a small -0.029 and is insignificant. So, among married couples, it appears that any response to the deduction came from the husband becoming self-employed.

Finally, as an additional robustness check and a comparison to other papers in this literature, we examine whether the effect of the policy for married individuals differs depending on the employment status of their spouse. As noted above, Velamuri (2008) examined the effect of the TRA86 on the decision of employed women to become self-employed by comparing those covered under a spousal plan to those who were not, and found significant effects for women who were not covered under a spousal plan. Unfortunately, direct information on health insurance coverage for each spouse is not available. So, we create a proxy for whether a spouse's job might provide health insurance by creating an indicator variable for whether the spouse's wages were less than $25,000. Data from the SIPP suggests that full time workers are almost four times more likely to be covered under an employer's plan than those who work part time,[28] and $25,000 corresponds roughly to full time work at a wage of $12.50. Thus, taxpayers whose spouses earned less than this amount are less likely to be covered under a spousal health insurance plan.

Rows 7 and 8 present the results from these specifications. In Row 7, when the sample includes married men, the coefficient on the price of self-employed health

[28] See Bhandari, Shailesh. (2002). "Employment-Based Health Insurance: 1997" http://www.census.gov/prod/2003pubs/p70-81.pdf, Table 3.

insurance interacted with the wife's wages falling below $25,000 is negative and significant, suggesting that those who were less likely to have a spousal offer of health insurance were more responsive to the increased deduction. In Row 8, the sample includes married women. In this specification, the interaction is the correct sign and larger than the coefficient on the SEHI tax price specification with no interaction, providing some suggestive evidence that (consistent with Velamuri (2008)) women who were less likely to have spousal coverage responded to the deduction. The coefficient, however, is insignificant.

7. Conclusion

The Omnibus Consolidated and Emergency Supplemental Appropriations Act of 1998 (OCESA) increased the deductibility of health insurance premiums and in effect reduced the price of health insurance while self-employed. This exogenous change in the cost of health insurance provides a natural experiment to assess the sensitivity of the self-employment decision to health insurance prices. Using a panel of tax returns from 1999 to 2004, we estimate the extent to which the level of self-employment, the entry into self-employment and exit from self-employment are related to the after-tax price of health insurance.

Our results suggest that the 6.0 percentage point decline in the tax price of health insurance while self-employed between 1999 and 2004 increased the probability of being self-employed by about 1.6 percentage points, or by 12.8%. We are able to show that tax units responded along numerous margins, both in switching between no self-employment

and self-employment and in increasing the intensity of self-employment (including up to the point of being exclusively self-employed). For the margin between no and some self-employment, we also find that the decrease in the tax price of health insurance for the self-employed increased the probability of entering self-employment by 24.3% and decreased the probability of exit by 16.3%.

Our results suggest that making health insurance for the self-employed cheaper by providing a larger tax deduction had a large and significant effect on the propensity to be self-employed, the numbers of individuals entering self-employment and the likelihood individuals will remain self-employed. Thus, we are able to show that reducing the cost of health insurance for the self-employed has an important effect on the choice of employment mode. The results also imply that policies that try to equalize the tax treatment of health insurance for the self-employed and health insurance for those employed by a firm will most likely further induce self-employment. Furthermore, although entrepreneurship per se cannot be directly observed in our data, an increase in self-employment (including both experimenting with self-employment and increasing the extent to which a taxpayer's income comes from self-employment) is likely to correspond with an increase in entrepreneurial activity, which is believed to be an important vehicle for economic growth. Hence, providing the self-employed cheaper and better access to health insurance may induce economic growth.

However, there are two major limitations to our study that make generalizing the effects of OCESA on self-employed be interpreted as an effect on entrepreneurial activity and economic growth. First, although tax data is one of the best available sources to identify individuals who are self-employed, it is not clear that the measures of self-

employed we use translates well to a higher amount entrepreneurial activity. It may be that the taxpayers on the margin between being self-employed and not are less likely to be entrepreneurial than those that already are self-employed. Hence, inducing additional people to become self-employed may not have as great of an impact on economic growth as does the average self-employed person. Second, these results take the insurance markets for self-employed taxpayers as given. If other policies altered the individual health insurance market, the effectiveness of tax policy toward self-employed health insurance in encouraging self-employment may be different than those found here.

Nonetheless, our results suggest that increasing the subsidy for health insurance to the self-employed has a large and significant effect on the propensity to be self-employed. If policy makers would like to increase the amount of self-employment, further lowering the cost of health insurance while self-employed is likely to lead to this result.

References

Bakija, Jon. (2008). "Documentation for a Comprehensive Historical U.S. Federal and State Income Tax Calculator Program" Working paper, Williams College. http://www.williams.edu/Economics/papers/bakijaDocumentation_IncTaxCalc.pdf

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. (2000). "Effects of the U. S. Tax System on Transitions into Self-Employment." *Labour Economics.* 7, 547-575.

Bruce, Donald. (2001). "Taxes and Entrepreneurial Endurance: Evidence from the Self-Employed." *National Tax Journal*. 55, 5-24.

Burbidge, John B., Lonnie Magee and A. Leslie Robb. 1988 "Alternative Transformations to Handle Extreme Values of the Dependent Variable." *Journal of the American Statistical Association*. 83, 123-127.

DeCicca, Philip. (2007). "Health Insurance Availability and Entrepreneurship: Evidence from New Jersey." Working Paper.

Fairlie, Robert and Bruce D. Meyer. (1999). "Trends in Self-Employment Among White and Black Men: 1910-1990." NBER Working Paper 7182.

Gentry, William and R. Glenn Hubbard. (2000). "Tax Policy and Entrepreneurial Entry." *American Economic Review*. 90(2):283-287.

Gruber, Jonathan and Brigitte Madrian (2002). "Health Insurance, Labor Supply, and Job Mobility: A Critical Review of the Literature". NBER working paper 8817.

Gruber, Jonathan and James Poterba. (1994). "Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-Employed." *The Quarterly Journal of Economics*. 109(3): 701-733.

Gumus, Gulcin and Tracy L. Regan. (2008a). "Tax Incentives as a Solution to the Uninsured: Evidence from the Self-Employed." Working Paper.

Gumus, Gulcin and Tracy L. Regan. (2009). "Exits from Self-Employment and the Role of Health Insurance." Working Paper.

Gurley-Calvez, Tami. (2006). "Health Insurance Deductibility and Entrepreneurial Survival." Report for Small Business Association, Office of Advocacy.

Gurley-Calves, Tami and Donald Bruce (2008). "Do Tax Cuts Promote Entrepreneurial

Activity?" *National Tax Journal*. 61(2): 225-250.

Heim, Bradley T. and Ithai Z. Lurie. (Forthcoming). "Do Increased Premium Subsidies Affect How Much Health Insurance Is Purchased? Evidence from the Self-Employed." *Journal of Health Economics*.

Holtz-Eakin, Douglas, John R. Penrod, and Harvey S. Rosen. (1996). "Health Insurance and the Supply of Entrepreneurs." *Journal of Public Economics.* 62(1-2): 209-235.

Le, Anh. (1999). "Empirical Studies of Self-Employment." *Journal of Economic Surveys*. 13:381-416.

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

LoSasso, A.T. and I.Z. Lurie (2009). "Community Rating and the Market for Private Non-Group Health Insurance." *Journal of Public Economics.* 93(1-2):264-279.

Madrian, Brigitte (1994). "Employment-Based Health Insurance and Job Mobility: Is There Evidence of Job-Lock?" *Quarterly Journal of Economics* 109(1): 27-54.

Madrian, Brigitte C. and Lars J. Lefgren. (1998). "The Effect of Health Insurance on Transitions to Self-Employment." Unpublished mimeo. University of Chicago Population Research Center.

Moore, Kevin. (2003). "The Effects of the 1986 and 1993 Tax Reforms on Self-Employment." *Federal Reserve Working Paper.*

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

Parker, S. (1996). "A Time Series Model of Self-Employment Under Uncertainty." *Economica*. 63, 459-475.

Scheutze, Herb J. (1998). "Taxes, Economic Conditions, and Recent Trends in Male Self-Employment: A Canada-U.S. Comparison." Working Paper.

Selden, Thomas. (2009). "The Impact of Increased Tax Subsidies on the Insurance Coverage of Self-Employed Families: Evidence from the 1996-2004 Medical Expenditure Panel Survey." *Journal of Human Resources.*.44(1): 115-119.

Staiger, Douglas, and James H. Stock. 1997. "Instrumental Variables Regression with Weak Instruments." *Econometrica.* 65(3):557–86

Velamuri, Malathi (2008). ”Taxes, Health Insurance and Women's Self-Employment.” Working paper.

Weber, Michael and Victoria L. Bryant. (2005). “The 1999 Individual Income Tax Return Edited Panel.” in *2005 Proceedings of the American Statistical Association.* Alexandria, VA: American Statistical Association.

Wellington, Alison J. (2001). “Health Insurance Coverage and Entrepreneurship.” *Contemporary Economic Policy*. 19(4):465-478.

Figures

Figure 1: Self-Employed Tax Prices of Health Insurance by State and Income Level

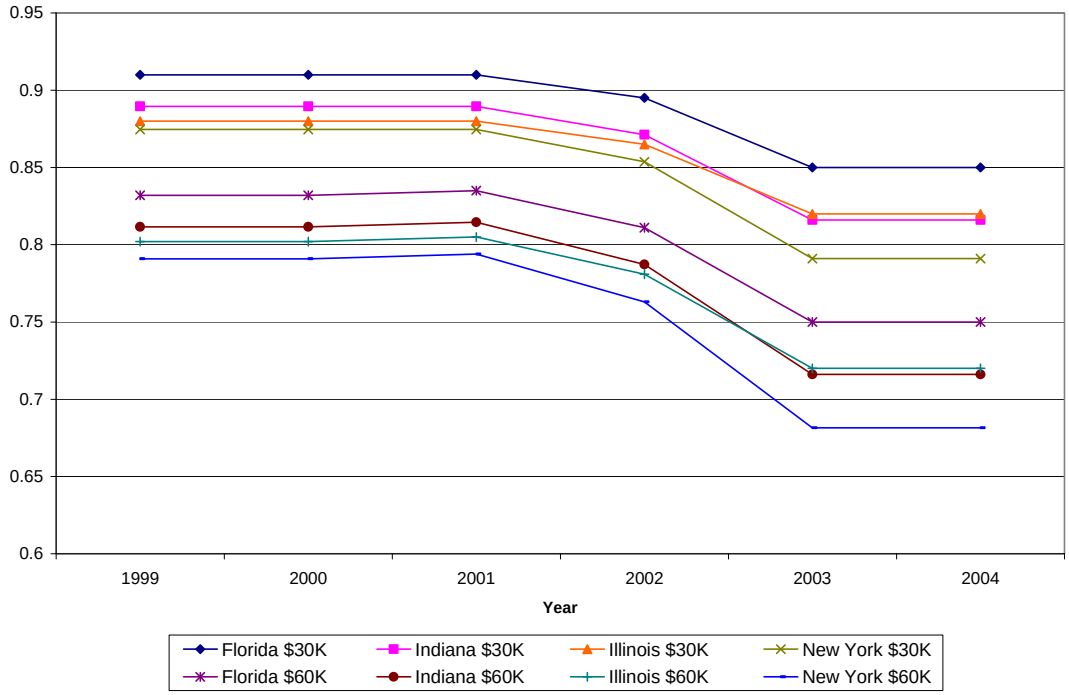
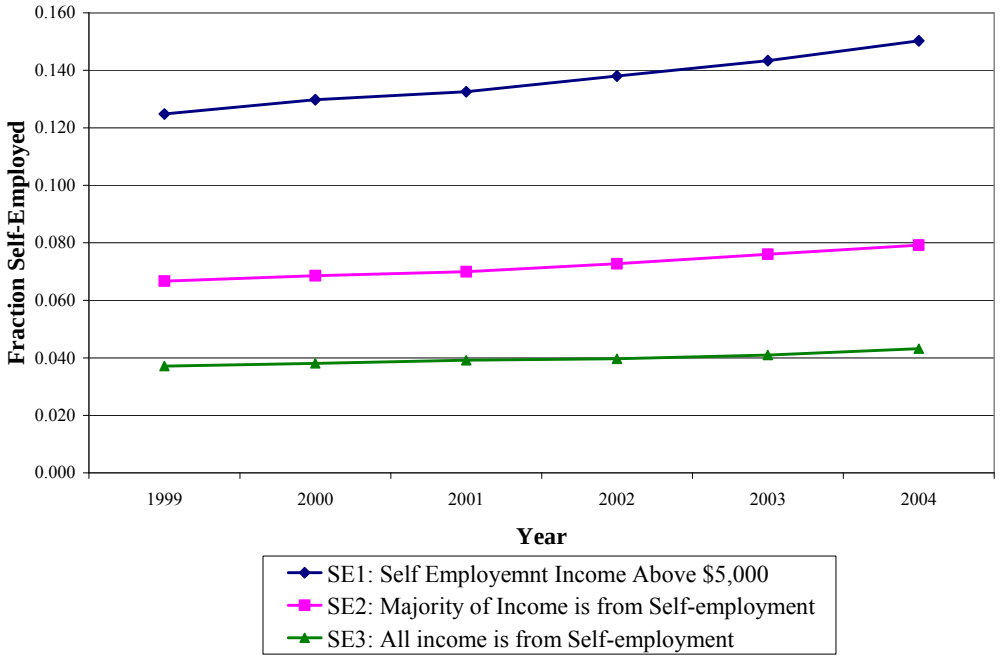
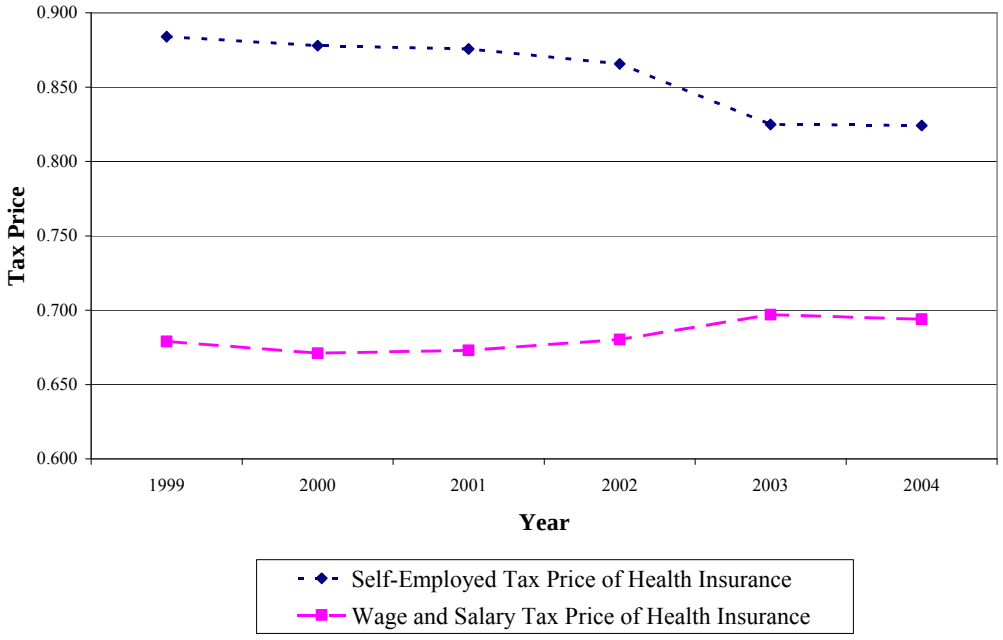


Figure 2: Trends in Self-Employment and the Tax Price of Health Insurance

(a) Self Employment Levels



(b) Tax Price of Health Insurance



Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns.

Tables

Table 1: Sample Statistics (N= 236,878)

	Mean	Standard Deviation
SE1: Self Employment Business Income Above $5,000 (in absolute value)	0.136	0.343
SE2: Majority of Business Income from Self-employment	0.072	0.259
SE3: All Business income is from Self-employment	0.040	0.195
SE4: Self Employment Business Income Above $5,000 (in absolute value) with HI deduction	0.033	0.178
SE5: Self Employment Business income Above $5,000 (in absolute value) without HI deduction	0.103	0.304
Exit1 Defined as:SE1(T)=0|SE1(T-1)=1 (N=23,413)	0.200	0.400
Exit2 Defined as:SE2(T)=0|SE2(T-1)=1 (N=12,200)	0.209	0.407
Exit3 Defined as:SE3(T)=0|SE3(T-1)=1 (N=6,620)	0.224	0.417
Entry1 Defined as:SE1(T)=1|SE1(T-1)=0 (N=144,400)	0.040	0.195
Entry2 Defined as:SE2(T)=1|SE2(T-1)=0 (N=155,613)	0.021	0.142
Entry3 Defined as:SE3(T)=1|SE3(T-1)=0 (N=161,193)	0.011	0.106
Wage and Salary Tax Price of Health Insurance	0.682	0.126
Self-employed Tax Price of Health Insurance	0.859	0.096
Total Income	59,204	206,691
Age	42.912	10.652
Number of Children	0.850	1.091
Filling Status: Single	0.340	0.474
Filling Status: Married filling Jointly	0.481	0.500
Filling Status: Head of Household	0.178	0.382
Year=1999	0.177	0.382
Year=2000	0.170	0.376
Year=2001	0.167	0.373
Year=2002	0.164	0.371
Year=2003	0.162	0.368
Year=2004	0.160	0.366
Percent of Returns claiming self-employed health deduction	0.038	0.191

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns.

Table 2: Instrumental Variables Regression Results for the Probability of Having Some Business Income - Robustness Checks

Dependent Variable	Base (1)	Excluding Splines (2)	Alternative Instrument (3)	Year Specific Income Splines (4)	Tax Prices Deflated By CPI Medical (5)	Excluding Fixed Effect (6)	Excluding Year Dummies (7)
SEHI Tax Price	**-0.267*** **	**-0.344*** **	**-0.423** **	**-0.319***	**-0.336*** **	**0.317*** **	**-0.269*** **
	(0.057)	**(0.066)**	**(0.174)**	**(0.172)**	**(0.082)**	**(0.061)**	**(0.042)**
WSHI Tax Price	0.014	-0.03	-0.116	-0.065	-0.013	0.234***	0.092
	(0.133)	(0.167)	(0.120)	(0.226)	(0.105)	(0.040)	(0.107)
Age Squared /100	-0.026***	-0.021***	-0.028***	-0.027***	-0.026***	-0.011***	0.000
	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.001)	(0.001)
Number of Children	0.006*	0.007**	0.010**	0.008**	0.007**	0.000	0.008**
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.001)	(0.003)
Constant	0.909***	0.905***	1.225***	1.066***	0.989***	-0.488***	0.362***
	(0.133)	(0.148)	(0.248)	(0.186)	(0.143)	(0.058)	(0.112)
Income Spline	Yes	No	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	No
Year Specific Income Splines	No	No	No	Yes	No	No	No
Filing Status and Age Covariates	No	No	No	No	No	Yes	No
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	No	Yes
Number of Observations	178,649	178,649	128,478	178,649	178,649	178,649	178,649

Note: Data from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses. The alternative instrument was calculated by taking a taxpayer's twice lagged income variables, inflating to the year of the observation, calculating the marginal tax rates that would have applied, and using the result to calculate a synthetic tax price.
* implies significant at 10%; ** implies significant at 5%; *** implies significant at 1%

Table 3: Instrumental Variables Regression Results for the Probability of Being Self-Employed

Dependent Variable	Some SE Income (1)	Majority SE Income (2)	Exclusively SE Income (3)	Some SE Income With HI Deduction (4)	Some SE Income Without HI Deduction (5)
SEHI Tax Price	**-0.267*** **	**-0.191*** **	**-0.071** **	**-0.198*** **	**-0.069**
	(0.057)	**(0.043)**	**(0.033)**	**(0.032)**	**(0.058)**
WSHI Tax Price	0.014	0.127	0.078	-0.073	0.087
	(0.133)	(0.100)	(0.077)	(0.075)	(0.136)
Number of Children	-0.026***	-0.009***	-0.004***	-0.006***	-0.020***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Constant	0.006*	0.003	0.004**	0.006***	-0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Income Spline	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	178,649	178,649	178,649	178,649	178,649

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses.
* implies significant at 10%; ** implies significant at 5%; *** implies significant at 1%

Table 4: Instrumental Variable Regression Results for the Probability of Becoming Self-Employed

Dependent Variable	Some SE Income (1)	Majority SE Income (2)	Exclusively SE Income (3)	Some SE Income With HI Deduction (4)	Some SE Income Without HI Deduction (5)
SEHI Tax Price	**-0.146*** **	**-0.092** **	**0.033**	**-0.084*** **	**-0.062**
	(0.053)	**(0.036)**	**(0.026)**	**(0.018)**	**(0.051)**
WSHI Tax Price	0.113	0.181**	0.103*	0.025	0.088
	(0.103)	(0.072)	(0.055)	(0.035)	(0.097)
Age Squared /100	-0.017***	-0.005***	-0.001	-0.003***	-0.014***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Number of Children	0.001	0.001	0.002	0.002**	-0.001
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)
Constant	0.476***	0.199***	-0.062	0.120***	0.357***
	(0.109)	(0.076)	(0.057)	(0.037)	(0.104)
Income Spline	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	151,408	157,927	161,906	151,408	151,408

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses.
* implies significant at 10%; ** implies significant at 5%; *** implies significant at 1%

Table 5: Instrumental Variables Regression Results for the Probability of Exiting Self-Employment

Dependent Variable	Some SE Income (1)	Majority SE Income (2)	Exclusively SE Income (3)	Some SE Income With HI (4)	Some SE Income Without HI (5)
SEHI Tax Price	**0.608****	**1.129**	**0.852**	**0.824****	**0.025**
	(0.286)	**(2.636)**	**(2.334)**	**(0.366)**	**(0.563)**
WSHI Tax Price	-0.865	5.087	0.638	-2.815	-2.349
	(1.901)	(18.358)	(5.832)	(2.557)	(3.021)
Number of Children	0.003	0.046	-0.003	0.024	-0.018
	(0.017)	(0.196)	(0.095)	(0.021)	(0.031)
Constant	0.025	-0.059	0.001	0.085	0.043
	(0.027)	(0.297)	(0.116)	(0.054)	(0.046)
Income Spline	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	16,405	9,886	5,907	4,757	11,648

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses.
* implies significant at 10%; ** implies significant at 5%; *** implies significant at 1%

Table 6: Instrumental Variables Regression Results for Probability of Being Self-Employed, Entry Into Self-Employment, and Exit From Self-Employment, by Age, Presence of Children and Income

Sample Split \ Dependent Variable	Self-Employed (1)	Self-Employed with HI Deduction (2)	Self-Employed without HI Deduction (3)	Entry (4)	Exit (5)
Ages 25-39	-0.196*	-0.057	-0.139	-0.108	-3.925
	(0.116)	(0.058)	(0.116)	(0.103)	(20.791)
Ages 40-54	-0.190**	-0.284***	0.094	-0.053	0.819*
	(0.086)	(0.051)	(0.090)	(0.085)	(0.443)
Ages 55-64	-0.312**	-0.108	-0.204	-0.136	1.019*
	(0.138)	(0.084)	(0.141)	(0.141)	(0.603)
No Children	-0.281***	-0.217***	-0.064	-0.062	1.037**
	(0.078)	(0.045)	(0.077)	(0.067)	(0.471)
With Children	-0.308***	-0.200***	-0.109	-0.252***	0.403
	(0.088)	(0.048)	(0.091)	(0.088)	(0.311)
Low Income	-0.157*	-0.214***	0.057	-0.187**	0.753*
	(0.093)	(0.054)	(0.097)	(0.084)	(0.405)
High Income	-0.572***	-0.257***	-0.314*	-0.331**	3.818
	(0.169)	(0.094)	(0.170)	(0.147)	(11.765)

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Coefficients and standard errors of the tax price of health insurance for the self-employed from different regression models are presented in each cell.
* implies significant at 10%; ** implies significant at 5%; *** implies significant at 1%

Table 7: Instrumental Variables Regression Results for for Probability of Being Self-Employed, Entry Into Self-Employment, and Exit From Self-Employment, by Gender and Marital Status

Sample Split and Variable Used to Define Self Employment \ Dependent Variable	Self-Employed	Self-Employed with HI Deduction	Self-Employed without HI Deduction	Entry	Exit
(1) Base Specification (Tax Unit, Total Self-Employment Income)	-0.267***	-0.198***	-0.069	-0.146***	0.608**
	(0.057)	(0.032)	(0.058)	(0.053)	(0.286)
(2) Tax Unit, Schedule SE Income	-0.192***	-0.149***	-0.043	-0.117***	0.400
	(0.048)	(0.030)	(0.047)	(0.042)	(0.432)
(3) Single Males Schedule SE Income	-0.287***	-0.187***	-0.100	-0.109	-7.162
	(0.102)	(0.060)	(0.097)	(0.088)	(25.416)
(4) Single Females, Schedule SE Income	-0.112	-0.116**	0.004	-0.183***	-5.525
	(0.076)	(0.045)	(0.070)	(0.066)	(38.767)
(5) Married Males, Schedule SE Income	-0.190***	-0.122***	-0.068	-0.060	1.629
	(0.069)	(0.045)	(0.067)	(0.057)	(6.341)
(6) Married Females, Schedule SE Income	-0.029	-0.023	-0.006	-0.034	1.599
	(0.049)	(0.028)	(0.046)	(0.039)	(1.708)
(7) Married Males, Schedule SE Income					
SEHI Tax Price	-0.138**	-0.085*	-0.052	-0.036	1.626
	(0.068)	(0.045)	(0.066)	(0.056)	(5.909)
SEHI Tax Price X Wife's Wages<25K	-0.108**	-0.069**	-0.039	-0.06	0.083
	(0.047)	(0.031)	(0.045)	(0.038)	(2.668)
(8) Married Females, Schedule SE Income					
SEHI Tax Price	0.022	-0.032	0.054	-0.023	0.854
	(0.070)	(0.041)	(0.066)	(0.057)	(1.763)
SEHI Tax Price X Husband's wages<25K	-0.054	0.013	-0.067*	-0.010	0.837
	(0.042)	(0.024)	(0.039)	(0.034)	(0.869)

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Coefficients and standard errors of the tax price of health insurance for the self-employed from different regression models are presented in each cell except of the last four rows where two adjacent cells in each column represent results of one regression.
* implies significant at 10%; ** implies significant at 5%; *** implies significant at 1%

Appendix

Appendix Table 1: First Stage and Full Regression Results for Base Specification for Being Self-Employed

	Self-Employment Tax Price	Wage and Salary Tax Price	Probability of Being Self-Employed
SEHI Tax Price			-0.267***
			(0.057)
WSHI Tax Price			0.014
			(0.133)
Income Spline 1	0.000***	0.000	-0.002***
	(0.000)	(0.000)	(0.000)
Income Spline 2	-0.197***	-0.386***	-0.041
	(0.002)	(0.003)	(0.050)
Income Spline 3	-0.038***	-0.069***	-0.052***
	(0.003)	(0.005)	(0.017)
Income Spline 4	-0.048***	0.016***	-0.035**
	(0.004)	(0.006)	(0.018)
Income Spline 5	-0.173***	-0.127***	-0.110***
	(0.004)	(0.006)	(0.025)
Income Spline 6	-0.070***	-0.075***	-0.076***
	(0.004)	(0.006)	(0.022)
Income Spline 7	-0.049***	-0.060***	-0.040*
	(0.004)	(0.006)	(0.021)
Income Spline 8	-0.183***	-0.207***	-0.028
	(0.004)	(0.006)	(0.033)
Income Spline 9	-0.138***	-0.044***	-0.051***
	(0.003)	(0.005)	(0.016)
Income Spline 10	-0.044***	-0.045***	0.014*
	(0.001)	(0.002)	(0.008)
Age Squared /100	-0.006***	-0.004***	-0.026***
	(0.000)	(0.001)	(0.002)
Number of Children	0.015***	0.016***	0.006*
	(0.001)	(0.001)	(0.003)
Year Dummy: 2001	0.004***	0.005***	0.024***
	(0.001)	(0.001)	(0.002)
Year Dummy: 2002	0.002***	0.013***	0.049***
	(0.001)	(0.001)	(0.004)
Year Dummy: 2003	-0.015***	0.031***	0.070***
	(0.001)	(0.002)	(0.007)
Year Dummy: 2004	-0.009***	0.033***	0.101***
	(0.002)	(0.002)	(0.009)
Instrument : SEHI Tax Price	0.427***	0.007	
	(0.005)	(0.008)	
Instrument : WSHI Tax Price	-0.107***	0.153***	
	(0.005)	(0.007)	
Constant	0.827***	0.851***	0.909***

	Self-Employment Tax Price	Wage and Salary Tax Price	Probability of Being Self-Employed
	(0.010)	(0.014)	(0.133)
Number of Observations	178,649	178,649	178,649
Shea Partial R^2	0.060	0.006	
Partial R^2	0.049	0.005	
F(2,178630)	4572.8	407.2	
P-value	0.00	0.00	

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses.
* implies significant at 10%; ** implies significant at 5%; *** implies significant at 1%