

The Effect of Self-Employed Health Insurance Subsidies on Self-Employment

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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 increased the probability of being self-employed by 1.5 percentage points, and increased the probability that a taxpayer would be primarily or exclusively self-employed by 1.1 and 0.35 percentage points respectively. These effects explain about a third to a half of the total increase in self-employment by these definitions over the sample period. We also find that the probability of entering self-employment increased by 0.8 percentage points and find suggestive evidence that the probability of exit decreased by 2.8 percentage points.

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1. Introduction

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 lower expenditures on underwriting, advertising, and enrollment. Second, ESI premiums reflect greater risk pooling, which lower the variance of 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.¹

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 that allowed the self-employed to 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, which further reduced the after-tax price of health insurance while self-employed. A number of papers, including Gruber and Poterba (1994), Selden (2009), Heim and Lurie (2009) each examine the effect of a subset of these tax changes on the take-up of health insurance among the self-employed and find significant effects on the decision to purchase health insurance.² Heim and Lurie (2009) additionally find a significant effect of the tax change on 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.³ Two working papers have examined the effect of these tax policy changes on the propensity to be self-employed. 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

¹ 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.

² On the other hand, Gumus and Regan (2008) do not find a significant effect in a recent working paper.

³ This paper is also related the literature that began with Madrian (1994) examining the effect that ESI has on various work margins. Gruber and Madrian (2002) provide a nice survey of this “job-lock” literature. Several papers, including Holtz-Eakin et al. (1996), Madrian and Lefgren (1998), Wellington (2001), Fairlie et al. (2008), and Gumus and Regan (2009) have examined the effect of ESI on the decision to be self-employed, though with mixed results.

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.^{4,5}

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.⁶

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

⁴ 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.

⁵ 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%.

⁶ In addition, it is possible that taxpayers could switch from a corporate business form that is subject to the corporate income tax to a form of business that is taxed at the individual level in response to the policy change. Unfortunately, to examine whether this is the case, we would need a dataset that contains matched corporate-individual tax forms, which we do not have.

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, the 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 all of the taxpayer's earned income comes self-employment). 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.

Three limitations to this study should be noted. First, unlike the Current Population Survey, which has often been used in studies of self-employment, tax data does not contain information on whether taxpayers identify themselves as self-employed. Thus, we must resort to using information on the amount of reported self-employment income at the tax unit level to create measures that attempt to ascertain whether the taxpayer is self-employed. Second, because eligibility to claim the self-employed health insurance deduction depends in part on whether the taxpayer is offered health insurance by an employer, which is not observed in tax data, we cannot account for this in our key independent variable, the after-tax price of self-employed health insurance. Because this is more likely to be a problem for married taxpayers (for whom an offer of family health insurance for one spouse can make the other spouse ineligible to claim the deduction), we report some results separately by marital status. Third, the effect of the deduction may

differ across taxpayers depending on a number of characteristics, some of which (such as the desire to have children or health status) are unobserved in tax data. We are able, however, to examine whether the estimated effect differs along observable dimensions (such as marital status and the age of the taxpayer).

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 decline in the tax price of health insurance while self-employed between 1999 and 2004 increased the probability of being self-employed by about 1.5 percentage points. 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 1.1 and 0.35 percentage points respectively. These effects explain about a third to a half of the total increase in self-employment by these definitions over the sample period. 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 0.8 percentage points, and find suggestive evidence that the decrease in price decreased the probability of exiting self-employment by 2.8 percentage points.

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 the taxpayer itemized deductions and only to the extent that total health expenditures exceeded 5% of their adjusted gross income (AGI).⁷ The passage of TRA86 allowed the self-employed to deduct 25% of their premiums, regardless of whether the taxpayer itemized deductions, starting in 1987. A self-employed taxpayer is eligible to take the deduction if the taxpayer has a net profit from self-employment⁸ and the primary filer (and the secondary filer, if the taxpayer is married filing jointly) is 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 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.

⁷ TRA86 increased the threshold for itemizing medical expenses to 7.5% of AGI.

⁸ Greater than 2% shareholders of an S corporation that receive wages are also eligible for the deduction. The IRS defines an S corporation as a corporation that elects to pass corporate income, losses, deductions and credit through to their shareholders for federal tax purposes. This income is then reported on the shareholders' individual tax returns.

During the period under analysis, states also changed the deductible fraction of self-employed health insurance premiums. In 1999, 3 states did not allow any deduction,⁹ 4 states had deductions that ranged from 40% to 70%,¹⁰ 26 states matched the federal deduction, and 9 states allowed full deductibility of premiums.¹¹ By 2004, only 2 states did not allow the deduction and 40 states allowed the self-employed to deduct 100% of premiums.¹²

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 after-tax price of health insurance if self-employed, the after-tax price of health insurance if the taxpayer is a wage and salary worker, the after-tax share of income, and other control variables.

Specifying the after-tax prices and share in logs, the decision to be self-employed can be represented by the following equation:

$$(1) \quad SE_{it} = \alpha_1 \ln(\Pi_{it}^{SE} P_{it}^{SE}) + \alpha_2 \ln(\Pi_{it}^{WS} P_{it}^{WS}) + \alpha_3 \ln(T_{it}) + \beta_1 X_{it} + V_i + \varepsilon_{it},$$

⁹ These states are Maine, New Jersey, and Pennsylvania.

¹⁰ These states are California, Massachusetts, Utah, and Kentucky.

¹¹ These states are Delaware, Georgia, Illinois, Iowa, Minnesota, Montana, Ohio, South Carolina, and Wisconsin.

¹² Nine states did not have an income tax across this time period. However, two of these states (New Hampshire and Tennessee) tax capital income.

where SE_{it} is one if taxpayer i is self-employed in year t and zero otherwise. In this equation, Π_{it}^{SE} is the pre-tax price of health insurance if individual i is self-employed in year t , and P_{it}^{SE} is the cost of a dollar of health insurance when self-employed after taxes are taken into account (which will be referred to as the SEHI tax price). Similarly, Π_{it}^{WS} is the pre-tax price of health insurance if the individual is a wage and salary worker employed by a firm, and P_{it}^{WS} is the cost of a dollar of health insurance for a wage or salary worker after taxes are taken into account (which will be referred to as the WSHI tax price). Finally, T_{it} is the net of tax share (defined as one minus the individual's marginal tax rate)¹³, 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.

Because the tax data do not contain information on pre-tax premiums for taxpayers, we cannot explicitly control for Π_{it}^{SE} and Π_{it}^{WS} . However, if one makes the assumption that pre-tax health insurance premiums are a linear function of demographic characteristics, an individual fixed effect, and a time fixed effect, Equation (1) may be rewritten as

$$(2) \quad SE_{it} = \alpha_1 \ln(P_{it}^{SE}) + \alpha_2 \ln(P_{it}^{WS}) + \alpha_3 \ln(T_{it}) + \beta_1 X_{it} + V_i + \varepsilon_{it},$$

which forms the basis for our estimation equation below. The main covariates of interest are the prices of health insurance when self-employed or employed by a firm, and the net

¹³ Note that P_{it}^{SE} , P_{it}^{WS} , and T_{it} will be endogenous to the self-employment decision both because the self-employed might engage in more tax avoidance or evasion and because marginal tax rates increase with income. As a result, as noted below, we instrument for the tax variables in the estimation equation.

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.¹⁴

To derive the SEHI tax price, 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 that the taxpayer will save in taxes. On the federal tax return, the taxpayer will be able to deduct a share, θ_f , which will save $\theta_f \tau_f$ in federal income taxes, where τ_f denotes their federal marginal tax rate. In addition, the taxpayer will be able to deduct a share, θ_s , on the state tax return which will save $\theta_s \tau_s$ in state income taxes, where τ_s denotes their state marginal tax rate. If the taxpayer itemizes deductions and state income taxes go down, however, then the taxpayer's 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 SEHI tax price is given by (omitting the individual and year subscripts)¹⁵

$$(3) \quad P^{SE} = 1 - \theta_f \tau_f - \theta_s \tau_s + (\theta_s \tau_s \tau_f) * item$$

For wage and salary workers, 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

¹⁴ Several papers, including Long (1982), Moore (1983), Blau (1987), Parker (1996), Schuetze (1998), and Bruce (2000, 2001) find an effect of marginal tax rates on self-employment. However, Fairlie and Meyer (1999), and Moore (2003) find that the level of marginal tax rates does not have a consistent effect on self-employment, though Gentry and Hubbard (2000) find that more progressive taxation tends to decrease entry into self-employment. For a survey of studies that have examined other determinants of self-employment in several countries, see Le (1999).

¹⁵ This equation is somewhat of an approximation, as it ignores the Alternative Minimum Tax, deductibility of federal taxes at the state level in some states, and the fact that itemization status may depend on the amount of self-employment income. This is also true for the WSHI tax price below.

reduce the employee's after tax income by $1 - \tau_f - \tau_s + (\tau_s \tau_f) * item - \tau_p$. Thus, the WSHI tax price is the latter term divided by the former, and so¹⁶

$$(4) \quad P^{WS} = (1 - \tau_f - \tau_s + \tau_f \tau_s item - \tau_p) / (1 + \tau_p)$$

Finally, the net of tax share is given by

$$(5) \quad T = 1 - \tau_f - \tau_s + (\tau_s \tau_f) * item$$

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

During our time period, payroll tax rates did not change, and hence these two variables are almost perfectly collinear.¹⁷ As a result, we omit T_{it} from the estimation equation, and estimate:

$$(6) \quad SE_{it} = \alpha_1^1 \ln(P_{it}^{SE}) + \alpha_2^1 \ln(P_{it}^{WS}) + \beta_1^1 X_{it} + V_i + \varepsilon_{it}^1,$$

In this specification, α_2^1 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

$$(7) \quad Enter_{it} = \alpha_1^2 \ln(P_{it}^{SE}) + \alpha_2^2 \ln(P_{it}^{WS}) + \beta_1^2 X_{it} + V_i + \varepsilon_{it}^2,$$

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

¹⁶ For EITC recipients prior to 2002, the tax treatment of the employee's share of health insurance premiums was slightly different. Details of the derivation can be found in the working paper version of this paper.

¹⁷ Separate variation in P_{it}^{WS} and T_{it} comes solely from the change in the treatment of health insurance premiums for the EITC noted above.

$$(8) \quad Exit_{it} = \alpha_1^3 \ln(P_{it}^{SE}) + \alpha_2^3 \ln(P_{it}^{WS}) + \beta_1^3 X_{it} + V_i + \varepsilon_{it}^3,$$

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 across 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.¹⁸ 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 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,¹⁹ 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.

¹⁸ 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 increase the after-tax prices of health insurance, biasing the estimated coefficient toward zero or being positive.

¹⁹ For example, a single taxpayer may be less risk averse, while a taxpayer with children may be more risk averse.

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 create synthetic prices that are calculated by replacing the taxpayer's actual marginal tax rate in each year with the marginal tax rate that the taxpayer would have faced given the 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.²⁰ Thus, changes in the synthetic prices across years are driven solely by differences in the tax law across years, and not differences in the taxpayer's income and employment behavior. As a specification check, we also create two alternative instruments. In the first, following the elasticity of taxable income literature, we estimate (6) in first differences, and create instruments for the change in the log of the tax prices by taking the income and demographic variables from year $t-1$ of the difference and calculating the actual tax prices under that year's tax laws, then inflating nominal values to year t levels and calculating tax prices under the tax laws of year $t-1$, and finally taking the difference.²¹ In the second, we use 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.²² However, the partial R^2 and the F-test statistics on the SEHI tax price instrument in the SEHI tax price first stage regression suggested that the instrument

²⁰ 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.

²¹ In this specification, we first differenced the dependent variable, the endogenous tax prices, and other exogenous variables. The income splines, however, use income from year $t-1$. See Gruber and Saez (2002) for an example of this type of specification from the elasticity of taxable income literature. We also estimated a specification in which only the dependent variable and the tax prices were in first differences; the results were qualitatively similar.

²² 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.

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

To control for other characteristics of the taxpayers in the panel, the X_{it} vector includes variables created using information that is gathered from each taxpayer on the primary filer's age and the tax unit's total income, number of children²³, and filing status (single, married filing jointly, head of household, qualified widower)²⁴. There are a number of extreme outliers for the total income variable, and total income may be either positive or negative. 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 increases in 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 these considerations, in our base specification, we include a ten-piece spline in inverse hyperbolic sine (IHS) transformed total income.²⁵ We also include in X_{it} the age of the primary filer and its square, indicator variables for filing status, and 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.²⁶

²³ Because children of different ages might have different effects on self-employment or on pre-tax premiums due to differing health care needs, we separately include the number of children under 2, the number of children age 2-5, the number of children age 6-17, and the number of children age 18-24.

²⁴ We exclude taxpayers who are married filing separately, as we do not observe income variables from such a taxpayer's spouse.

²⁵ This transformation takes the form $IHS(y) = \log(y + \sqrt{y^2 + 1})$. See Burbidge, Magee and Robb (1988).

²⁶ The age and filing status variables are dropped from specifications that include individual-filing status-presence of children fixed effects.

4. 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, which spans the increase in the federal self-employed health insurance deduction from 60% in 1999 to 70% in 2002 and to 100% in 2003.²⁷ 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 on the decision to be primarily or exclusively self-employed. Fourth, because 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, then the taxpayer should also be more likely to take the deduction, hence 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.²⁸ However, the

²⁷ For more information on the 1999 Edited Panel, see Weber and Bryant (2005).

²⁸ Buchmueller et al (2007), using the 2002 SIPP, find that 84.4% of workers work for firms that offer health insurance to some employees, and 90% of those workers are offered insurance themselves, suggesting that around 76% of workers are offered insurance. A Kaiser Family Foundation (2009) health

inclusion of individual and year fixed effects helps to control for these.

For the estimation, we use 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.²⁹ 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 the primary taxpayer (and the secondary, if married filing jointly) is aged 25 to 64, to focus on individuals in their prime working years, leaving us with a sample of 236,878 returns from 48,396 different taxpayers.

We calculate total self-employment income by summing income and losses from sole proprietorships and farms (from Form 1040) and income and losses 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) forms the unit of analysis in our main specification.³⁰

Given that a tax unit may earn wages or a salary from a firm at the same time that

insurance survey of firms finds that, on average, 60% of firms offer health insurance coverage. The average offer rates differ substantially by firm size, from only 46% of firms with 3-9 workers up to 98% of very large firms (more than 200 employees). Offer rates are 72%, 87% and 95% for firms with 10-24, 25-49 and 50-199 employees, respectively.

²⁹ The full Edited Panel also contains a high income oversample. Since we do not focus in this paper on the behavior of high income taxpayers, we use only the strictly random sample, which obviates the need to weight the estimation sample.

³⁰ Self-employment income is also reported on Schedule SE (which includes income from sole proprietorships, farms, and partnerships, so long as it exceeds a small positive threshold) and is available at the individual level. 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. In some robustness checks, we attempted using Schedule SE income to define our dependent variable, and found that the coefficients were smaller, but insignificantly different from those in the base specification.

income is earned from self-employment and because taxpayers are not asked if they consider themselves to be self-employed, there is no clear cut definition in the tax data 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 of self-employment, the return must report more than \$5,000 (deflated to 2000 \$) in absolute value in income or loss from self-employment.³¹ 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 one filer earns a salary but a second filer has some self-employment activity. In addition, this variable will capture individuals who switch between a wage and salary job and self-employment in the middle of a year. 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.³² This variable will capture those for whom self-employment is their major income earning activity, including those for whom the primary earning spouse is self-employed while the other spouse holds a wage and salary job and those who are wage and salary workers for a short period and are self-employed the rest of the year. For the third definition, 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

³¹ We also tried thresholds of \$0, \$10,000, and \$20,000. The results were qualitatively similar.

³² 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.

self-employed health insurance deduction are centered among those who claim the deduction, we also use as a dependent variable the interaction between the self-employment indicator and an indicator 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 1040.³³

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 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 Bakija³⁴ 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 (3) and (4).

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-

³³ Line 28 in 1999-2001, line 30 in 2002, and line 29 in 2003-2004.

³⁴ Documentation for these tax calculators is detailed in Bakija (2008).

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 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 (the WSHI tax price) and mean tax price of health insurance for the self-employed (the 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 1. In this figure, we cut the sample to a balanced panel so that changes in the sample composition do not affect the trends in these variables. In Panel (a), the probability of being self-employed displays growth throughout the period for all three intensities of self-employment, with an apparent shift in trend after 2001. Overall, the rates of self-employment (in absolute value) for each of the three levels of self-employment increased by 21-27% from 1999 to 2004: those with above \$5,000 in self-

employment income increased from 14.3% to 17.4%, those with a majority of earned income from self-employment increased from 7.2% to 9.2%, and those with exclusively self-employment income increased from 3.8% to 4.8%.

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).³⁵ 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.

Figure 2 illustrates the source of identification for our base estimation specification.

³⁵ Prior to the passage of EGTRRA, the federal tax rate structure consisted of five brackets, ranging from 15% to 39.6%. Retroactive to July 1, 2001, EGTRRA created a sixth tax bracket, for which the tax rate was 10% on the first \$12,000 of taxable income for married couples and \$6,000 for single filers. In addition, in 2001, all of the remaining tax rates above the 15% bracket were reduced by half of a percentage point. These same rates were reduced an additional half of a percentage point in 2002. Under EGTRRA, tax rate reductions and standard deduction increases were scheduled to take effect in 2004, 2005, and 2006. The passage of JGTRRA in 2003, however, accelerated to 2003 the tax changes scheduled to occur under EGTRRA, resulting in marginal tax rates ranging from 10% to 35% and an increased standard deduction for married taxpayers.

For this figure, we again cut the sample to a balanced panel so that trends would not be influenced by changes in the sample composition. We then calculate the change in the SEHI tax price instrument between 2000 and 2004, which represents the change in price between these years due solely to changes in tax law (since the tax price instrument is based on characteristics of the taxpayer in 1999). We finally divide the sample into quartiles based on this change in price variable, and we graph the change in the self-employment rate from the 2000 rate (for each of the three definitions of self-employment) for each quartile.

Panel (a) presents the results for self-employment income being above \$5,000. In this panel, it is clear that quartiles that faced larger decreases in the SEHI tax price between 2000 and 2004 exhibited larger increases in self-employment, suggesting that the SEHI tax price is negatively related to the propensity to earn some amount of self-employment income. A similar pattern is found in Panel (b), which presents results for the majority of income coming from self-employment. In Panel (c), however, which presents results for exclusive self-employment, the increase in self-employment is largest for the first quartile, but the changes for quartiles two through four are about the same.

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.

5. 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.³⁶ This specification will capture the effect of the decrease in the price of health insurance while self-employed on the decision to at least experiment with self-employment. The coefficient on the SEHI tax price is -0.207 (with a standard error of 0.040), 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 SEHI tax price declined by 0.072 percent between 1999 and 2004³⁷ in the balanced panel, this coefficient would suggest a 1.49 percentage point increase in the probability of being self-employed $((-0.207)*(-0.072))$ or a 10.4% increase in self-employment (1.49% divided by 14.3%, which is the 1999 probability of being self-employed). Over this same period, the fraction of the balanced panel that was self-employed by this definition increased by 21.5%, so the increase in the SEHI deduction explains a little less than half of this increase. The coefficient on the WSHI tax price is -0.019 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.

³⁶ 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.

³⁷ From 0.874 to 0.811.

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 -0.267, 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 Columns 3 and 4, we try the alternative instruments for the SEHI and WSHI tax prices described above. In Column 3, using the first differencing instrument, the coefficient on the SEHI tax price decreases to -0.138 and is marginally significant, while in Column 4, using the two year lag instrument, the coefficient on the SEHI tax price increases to -0.263 and is highly significant, so the estimate from the base specification falls between these estimates. However, in neither of these cases is the estimate significantly different from that found in the base specification, and both of the standard errors are considerably larger.

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 5 we include year-specific ten

piece splines in total income. The resulting coefficient is -0.279, and is insignificantly different from the base specification.³⁸

Finally, in Column 6 and 7, we estimate (6) on single filers and married filers separately, since it is likely that measurement error in the SEHI tax price is less of a concern for single taxpayers. As noted above, taxpayers with an offer of health insurance from an employer are ineligible for the deduction, but because our dataset does not contain information on health insurance offers by employers, we cannot account for this in the SEHI tax price. This is more likely to be a problem for married taxpayers, because one spouse could earn a large fraction of the couple's income from self-employment, and the couple could still be ineligible for the SEHI deduction because the lower earning spouse has an offer of health insurance from his or her employer. For single taxpayers, it is more likely that if a taxpayer earns a substantial fraction of their income from self-employment, then they would lack an offer of insurance from a lower paying wage and salary job.

When the sample includes only single filers, the coefficient on the SEHI tax price drops somewhat to -0.153, though it is still highly significant and insignificantly different from the base specification. For married couples, the coefficient of -0.201 is almost the same as in the base specification.³⁹

³⁸ During the sample period, there were also changes to bonus depreciation and expensing rules. To examine whether these changes might bias our results upward, we tried two specifications. In the first, since the benefits of bonus depreciation would vary with the taxpayer's net of tax share (which is proxied for here with the WSHI tax price), we interacted the WSHI tax price with year dummies. In the second, since some states decoupled their depreciation rules from the federal depreciation rules, we interact the WSHI tax price with year dummies and a dummy reflecting whether the taxpayer's state decoupled. The results from both of these specifications were qualitatively similar to the base specification, and the coefficient on the SEHI tax price actually increased in magnitude, suggesting that changes in these rules are not the source of our significant results.

³⁹ We also examined whether including individual and year fixed effects has an effect on the estimated SEHI tax price coefficient. When individual fixed effects are omitted, the coefficient on the SEHI tax price

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 explain 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 -0.149 (with a standard error of 0.030), implying that taxpayers also responded to the tax change by increasing the intensity of self-employment. This coefficient implies that the 7.2 percent decline in the after-tax price of health insurance while self-employed led to a 1.07 percentage point (or a 14.9%) increase in the probability of having the majority of income coming from self-employment, or about 54% of the increase in self-employment by this definition over the sample period.

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, however, the estimated coefficient is only slightly different from the base specification.

In Column 3, the dependent variable is an indicator for the tax unit being exclusively self-employed.⁴⁰ 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 self-employment as their sole source of income. The coefficient in this column is a significant -0.049, and the estimated coefficient implies that the 7.2 percent decline in the after-tax price of health insurance while self-employed led to a 0.35 percentage point (or a 9.1%) increase in the probability of being exclusively self-employed, or about 36% of the total increase in self-employment by this definition over this period.

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 some 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

⁴⁰ That is, the tax unit reports self-employment income in excess of \$5,000 (in absolute value) and no wage and salary income.

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 -0.164. Although this coefficient is suggestive that individuals who became 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.⁴¹ If only the latter of these were true, however, we would expect the coefficient in Column 5 to be positive and 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.⁴² Similar to Table 3, the first three columns of these tables show results based on

⁴¹ Indeed, Heim and Lurie (2009) find significant, but modest, effects on the takeup of health insurance among the continuously self-employed during this period.

⁴² To be included in the estimation sample in Table 4, a taxpayer must not be self-employed (by the relevant definition) in the previous year. Similarly, to be included in the estimation sample in Table 5, a

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 -0.117 (with a standard error of 0.037) in the entry specification, which is statistically significant and of the correct sign. Given the decline in the SEHI tax price of 6.8% for the taxpayers who could potentially enter between 2000 and 2004,⁴³ this coefficient implies an increase of 0.80 percentage points in the probability of entering self-employment, or a 20.8% increase in the rate of entrance into self-employment. The coefficient on the SEHI tax price in the corresponding exit specification is correctly signed and marginally significant, with a coefficient of 0.449 (and a standard error of 0.234). The SEHI tax price declined by 6.3% among those who could potentially exit between 2000 and 2004, so this coefficient implies a decrease of 2.8 percentage points (or 15.8%) 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

taxpayer must be self-employed (by the relevant definition) in the previous year. As a result, the samples in these specifications are subsets of the overall estimation sample.

⁴³ In other words, those who were not self-employed in the previous year.

incorrectly signed and insignificant. In the exit specification, on the other hand, estimated coefficients are incorrectly signed and insignificant. 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. The source of the increase in the exclusively self-employed, on the other hand, is not clear.

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.⁴⁴ In both the entry and exit 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.

As was noted above, the effect of the deduction may differ across taxpayers depending on a number of characteristics that are correlated with the demand or need for health insurance. Unfortunately, a number of these are unobserved in tax data, such as the taxpayer's health status or intentions to have children. We are able, however, to examine whether the estimated effect differs with observable characteristics, such as marital status, age, gender, the presence of children, and income of the taxpayer.

Table 6 assesses whether the results differ by the age of the primary filer. For these sample cuts, we estimate separate equations for single taxpayers and for married

⁴⁴ 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 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 .

taxpayers, and 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 from single taxpayers were split according to whether the primary taxpayer was 25 to 39, 40 to 54, or 55 to 64 in the year of observation. When this is done, the results are somewhat mixed. The estimated coefficient on the SEHI tax price is correctly signed among all three groups (though is only marginally significant for the young and is insignificant for the middle age group), while the interaction between being self-employed and taking the self-employed health insurance deduction is marginally significant for the youngest group and significant for the middle group. Thus, the policy most clearly had an effect on the young group, and may have had an effect on the middle group as well. However, none of the coefficients in the entry or exit regressions are significant, and so it is unclear on which margin the effect operated.

In the fourth through sixth rows, observations from married taxpayers were split into the same three age groups. Here, the results are somewhat cleaner than for the single taxpayer sample. Again, the estimated coefficient on the SEHI tax price is correctly signed among all three groups, and is marginally significant for the middle and oldest group. However, 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.

We also tried specifications that estimated separate effects by income, presence of children, and gender. However, few differences were found along these dimensions.

6. 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 decline in the tax price of health insurance while self-employed between 1999 and 2004 increased the probability of being self-employed by about 1.7 percentage points. 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), with the estimated coefficients implying that the rate of self-

employment increased by between 9.1% and 14.9% due to the change in policy during these years. 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 0.8 percentage points, and find suggestive evidence that the probability of exit decreased by 2.8 percentage points.

Overall, the results in this paper imply substantial effects of the increase in the deductibility of self-employed health insurance on the propensity of taxpayers to be self-employed. Since a number of recent papers (including Gruber and Poterba (1994), Selden (2009) and Heim and Lurie (2009)) found significant effects of the same or earlier increases in the deduction on health insurance purchasing behavior, it is perhaps not surprising that this paper finds significant effects on the decision to be self-employed. In addition, the results are consistent with Velamuri (2008), who found that the TRA86 introduction of the self-employed health insurance deduction increased the rate of self-employment among woman by between 14% and 25%, though they are inconsistent with Gumus and Regan (2009), who find small or no effects. Finally, the fact that we find a significant effect of health insurance considerations on the decision to be self-employed is also consistent with results in Madrian and Lefgren (1998), Wellington (2001), Gumus and Regan (2009), and Fairlie (2008), who find that having some other source of health insurance coverage has a significant effect on the decision to be self-employed.

To put the size of our estimated effects in context, it is important to note that, during the time period under analysis, the rate of self-employment increased for each of our three definitions of self-employment by between 21.5% and 27.4%. Thus, although

our estimated effects are somewhat large, the policy change still only explains around a third to a half of the actual increase in self-employment during this period.

Nevertheless, 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. Consequently, these results imply that policies which further reduce the cost of health insurance for the self-employed are likely to increase the rate of self-employment.

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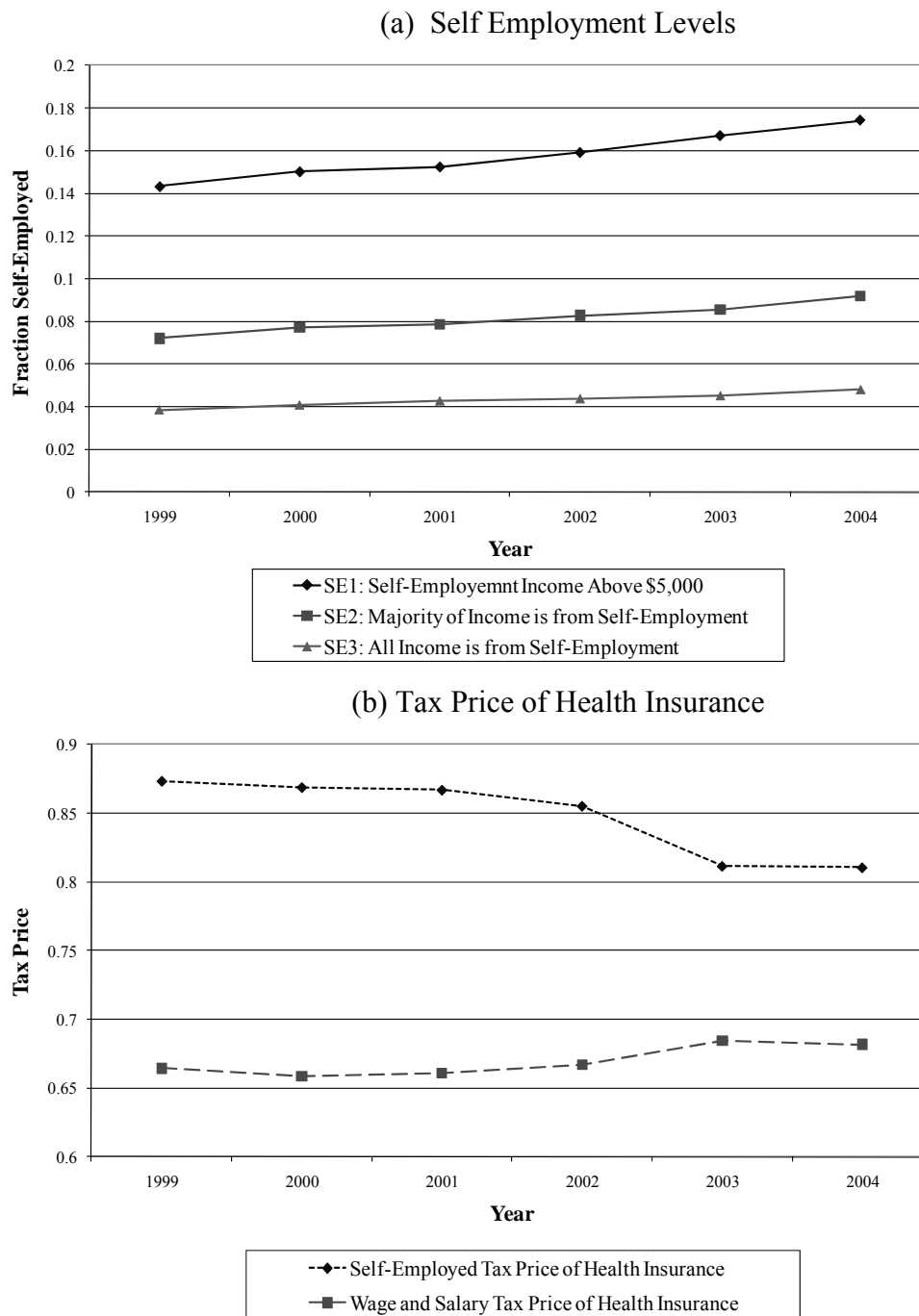
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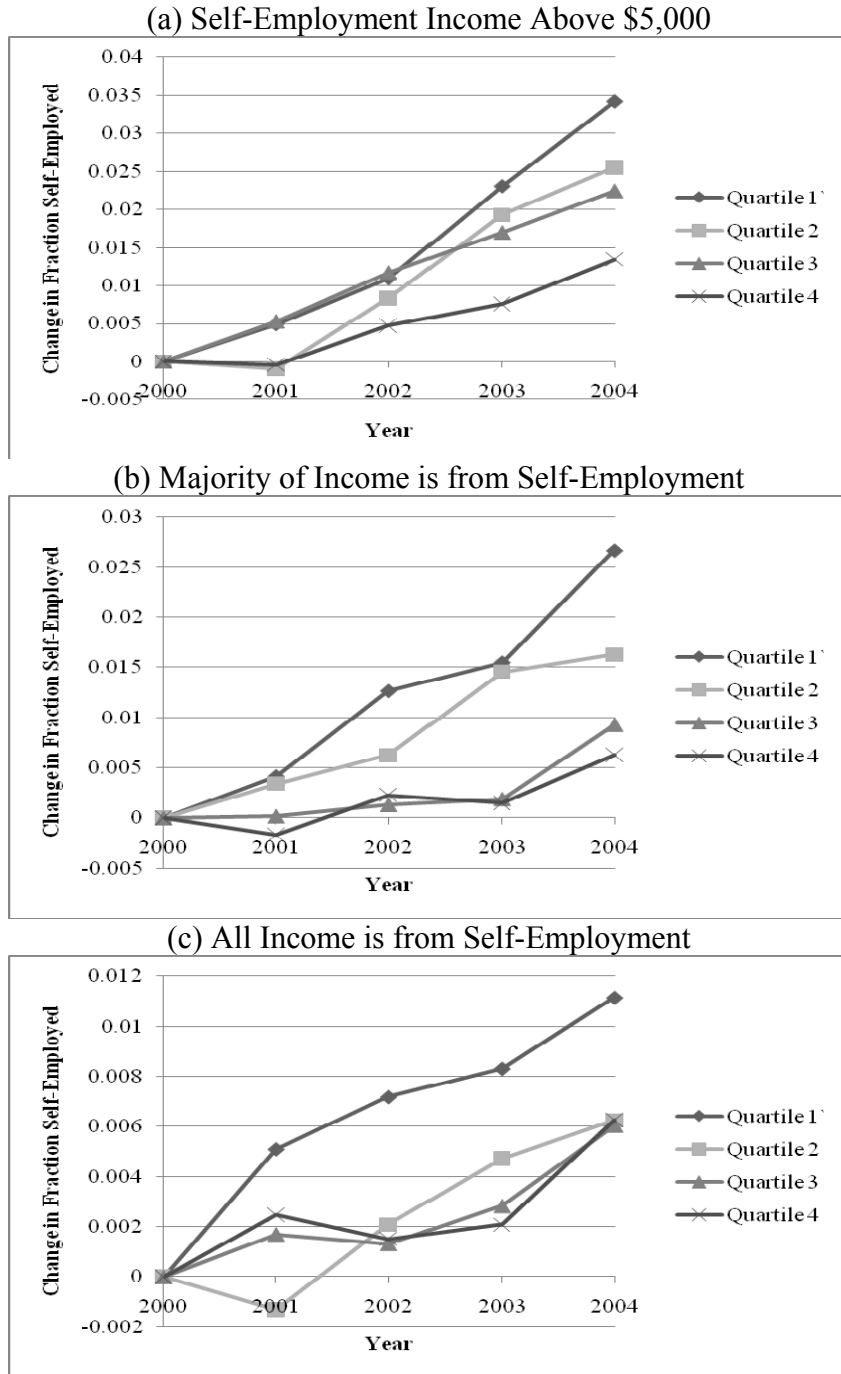
Figures

Figure 1: Trends in Self-Employment and the Tax Price of Health Insurance



Note: Data are from the CWS sample of the 1999-2004 Edited Panel of tax returns. Sample was cut to be a balanced panel.

Figure 2: Change in Self-Employment Rate from 2000 Rate by Quartile of Change in SEHI Tax Price Instrument Between 2000 and 2004



Notes: Data are from the CWS sample of the 1999-2004 Edited Panel of tax returns. Sample was cut to be a balanced panel. The change in the self-employed health insurance tax price between 2000 and 2004 for the first quartile fall below -0.088, for the second quartile fall between -0.088 and -0.069, for the third quartile fall between -0.069 and -0.025, and for the fourth quartile fall above -0.025.

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
Filing Status: Single	0.340	0.474
Filing Status: Married filing Jointly	0.481	0.500
Filing 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)	First Differencing Instrument (3)	Two Year Lag Instrument (4)	Year Specific Income Splines (5)	Singles (6)	Married (7)
Log of SEHI Tax Price	-0.207*** (0.040)	-0.267*** (0.051)	-0.138* (0.076)	-0.263*** (0.083)	-0.279** (0.122)	-0.153*** (0.052)	-0.201*** (0.058)
Log of WSHI Tax Price	-0.019 (0.082)	-0.041 (0.095)	0.044* (0.024)	-0.078 (0.099)	-0.048 (0.126)	-0.076 (0.116)	-0.042 (0.137)
Age Squared /100	-0.026*** (0.002)	-0.020*** (0.002)	-0.020*** (0.002)	-0.026*** (0.003)	-0.026*** (0.002)	-0.017*** (0.002)	-0.040*** (0.004)
Number of Children Less than 2	-0.008* (0.004)	-0.006 (0.005)	-0.004 (0.003)	-0.007 (0.005)	-0.006 (0.005)	-0.001 (0.008)	-0.007 (0.005)
Number of Children 2-5	-0.002 (0.004)	-0.001 (0.004)	-0.001 (0.003)	-0.002 (0.005)	0.000 (0.004)	-0.001 (0.006)	-0.001 (0.005)
Number of Children 6-17	0.006* (0.003)	0.007** (0.003)	-0.001 (0.003)	0.007* (0.004)	0.007** (0.003)	0.000 (0.005)	0.005 (0.004)
Number of Children 18-24	0.006** (0.003)	0.006** (0.003)	-0.002 (0.003)	0.007* (0.004)	0.008** (0.003)	-0.003 (0.004)	0.007 (0.004)
Constant	0.642*** (0.038)	0.518*** (0.055)	0.000 (0.006)	0.650*** (0.060)	0.666*** (0.038)	0.348*** (0.037)	1.070*** (0.076)
Including Income Spline	Yes	No	Yes	Yes	Yes	Yes	Yes
Including Year Specific Income Splines	No	No	No	No	Yes	No	No
Including Fixed Effects	Yes	Yes	No	Yes	Yes	Yes	Yes
Number of Observations	178,649	178,649	167,812	128,478	178,649	91,257	87,392

Note: Data from the CWSHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses. The first differencing instrument was calculated by taking the income variables from the first year of the difference and calculating tax prices under that year's tax laws, then inflating to next year's levels and calculating tax prices under the tax laws one year forward. The two year lag 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. All specifications include year dummies and (except the first differencing instrument specification) individual fixed effects. Filing status and age covariates are collinear with the combination of year and individual fixed effects, and are omitted.

* 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)
Log of SEHI Tax Price	-0.207*** (0.040)	-0.149*** (0.030)	-0.049** (0.023)	-0.164*** (0.023)	-0.043 (0.041)
Log of WSHI Tax Price	-0.019 (0.082)	0.047 (0.062)	0.047 (0.047)	-0.048 (0.046)	0.029 (0.084)
Age Squared /100	-0.026*** (0.002)	-0.009*** (0.002)	-0.004*** (0.001)	-0.006*** (0.001)	-0.020*** (0.002)
Number of Children Less than 2	-0.008* (0.004)	-0.002 (0.003)	0.003 (0.002)	0.003 (0.002)	-0.011*** (0.004)
Number of Children 2-5	-0.002 (0.004)	0.003 (0.003)	0.002 (0.002)	0.005*** (0.002)	-0.007* (0.004)
Number of Children 6-17	0.006* (0.003)	0.005** (0.002)	0.004** (0.002)	0.008*** (0.002)	-0.003 (0.003)
Number of Children 18-24	0.006** (0.003)	0.005** (0.002)	0.002 (0.002)	0.004** (0.002)	0.003 (0.003)
Constant	0.642*** (0.038)	0.343*** (0.029)	0.136*** (0.022)	0.077*** (0.021)	0.565*** (0.039)
Including Income Spline	Yes	Yes	Yes	Yes	Yes
Including Year Dummies	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. All specifications include a ten piece spline in IHS transformed total income, year indicator variables, and individual fixed effects.

* 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 (4)	Some SE Income Without HI (5)
Log of SEHI Tax Price	-0.117*** (0.037)	-0.071*** (0.025)	0.024 (0.018)	-0.065*** (0.013)	-0.052 (0.035)
Log of WSHI Tax Price	0.059 (0.065)	0.080* (0.046)	0.055 (0.034)	0.011 (0.022)	0.048 (0.062)
Age Squared /100	-0.016*** (0.002)	-0.005*** (0.001)	-0.001 (0.001)	-0.003*** (0.001)	-0.013*** (0.002)
Number of Children Less than 2	-0.011*** (0.004)	-0.002 (0.002)	0.001 (0.002)	0.000 (0.001)	-0.011*** (0.003)
Number of Children 2-5	-0.002 (0.003)	0.002 (0.002)	0.002 (0.002)	0.002 (0.001)	-0.004 (0.003)
Number of Children 6-17	0.002 (0.003)	0.002 (0.002)	0.002 (0.001)	0.002** (0.001)	0.000 (0.002)
Number of Children 18-24	0.006** (0.003)	0.004** (0.002)	0.000 (0.001)	0.002** (0.001)	0.004* (0.003)
Constant	0.437*** (0.034)	0.285*** (0.024)	0.074*** (0.018)	0.059*** (0.012)	0.378*** (0.033)
Including Income Spline	Yes	Yes	Yes	Yes	Yes
Including Year Dummies	Yes	Yes	Yes	Yes	Yes
Number of Observations	144,400	155,613	161,193	144,400	144,400

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses. All specifications include a ten piece spline in IHS transformed total income, year indicator variables, and individual fixed effects.

* 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)
Log of SEHI Tax Price	0.449* (0.234)	-0.312 (1.669)	-3.098 (26.072)	0.431* (0.247)	0.108 (0.387)
Log of WSHI Tax Price	-0.260 (0.817)	-2.082 (5.452)	-5.059 (34.848)	-0.994 (0.888)	-0.760 (1.264)
Age Squared /100	0.005 (0.013)	-0.037 (0.079)	-0.118 (0.766)	0.022 (0.019)	-0.007 (0.021)
Number of Children Less than 2	0.033 (0.026)	0.034 (0.116)	0.067 (0.927)	0.083** (0.039)	0.030 (0.040)
Number of Children 2-5	0.041 (0.026)	0.082 (0.182)	0.199 (1.228)	0.076** (0.032)	0.053 (0.043)
Number of Children 6-17	0.023 (0.017)	0.054 (0.104)	0.119 (0.703)	0.064** (0.027)	0.026 (0.028)
Number of Children 18-24	0.011 (0.013)	0.040 (0.036)	0.052 (0.182)	0.054** (0.026)	0.003 (0.016)
Constant	-0.016 (0.238)	0.595 (0.928)	1.830 (10.525)	-0.459 (0.417)	0.153 (0.335)
Including Income Spline	Yes	Yes	Yes	Yes	Yes
Including Year Dummies	Yes	Yes	Yes	Yes	Yes
Number of Observations	23,413	12,200	6,620	5,873	17,540

Note: Data are from the CWHS sample of the 1999-2004 Edited Panel of tax returns. Standard errors are in parentheses. All specifications include a ten piece spline in IHS transformed total income, year indicator variables, and individual fixed effects.

* 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 and Marital Status

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 Single	-0.163* (0.098)	-0.084* (0.045)	-0.079 (0.095)	-0.107 (0.082)	-74.407 (7141.897)
Ages 40-54 Single	-0.055 (0.081)	-0.139*** (0.047)	0.084 (0.081)	-0.065 (0.069)	-22.327 (177.318)
Ages 55-64 Single	-0.244** (0.110)	-0.009 (0.067)	-0.235** (0.112)	-0.162 (0.108)	0.381 (0.865)
Ages 25-39 Married	-0.034 (0.147)	0.021 (0.077)	-0.056 (0.149)	0.042 (0.131)	1.069 (1.928)
Ages 40-54 Married	-0.151* (0.086)	-0.247*** (0.052)	0.097 (0.091)	0.045 (0.095)	0.566** (0.288)
Ages 55-64 Married	-0.235* (0.140)	-0.122 (0.085)	-0.113 (0.143)	-0.044 (0.132)	0.808 (0.565)

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. All specifications include a ten piece spline in IHS transformed total income, year indicator variables, individual fixed effects, the number of children, and a constant.

* 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

	Log of SEHI Tax Price	Log of WSHI Tax Price	Probability of Being SE
Log of SEHI Tax Price			-0.207*** (0.034)
Log of WSHI Tax Price			-0.019 (0.069)
Income Spline 1	0.000* (0.000)	0.000 (0.000)	-0.002*** (0.000)
Income Spline 2	-0.204*** (0.002)	-0.448*** (0.003)	-0.045 (0.033)
Income Spline 3	-0.051*** (0.003)	-0.147*** (0.005)	-0.056*** (0.016)
Income Spline 4	-0.051*** (0.004)	0.040*** (0.006)	-0.032** (0.015)
Income Spline 5	-0.210*** (0.004)	-0.187*** (0.007)	-0.113*** (0.022)
Income Spline 6	-0.082*** (0.004)	-0.107*** (0.007)	-0.077*** (0.018)
Income Spline 7	-0.056*** (0.004)	-0.088*** (0.007)	-0.041** (0.018)
Income Spline 8	-0.222*** (0.004)	-0.324*** (0.007)	-0.035 (0.029)
Income Spline 9	-0.178*** (0.003)	-0.064*** (0.005)	-0.053*** (0.014)
Income Spline 10	-0.060*** (0.001)	-0.076*** (0.002)	0.012 (0.007)
Age Squared /100	-0.007*** (0.000)	-0.004*** (0.001)	-0.026*** (0.002)
Number of Children Less than 2	0.015*** (0.001)	0.026*** (0.001)	-0.008** (0.004)
Number of Children 2-5	0.016*** (0.001)	0.023*** (0.001)	-0.002 (0.003)
Number of Children 6-17	0.016*** (0.001)	0.020*** (0.001)	0.006** (0.003)
Number of Children 18-24	0.014*** (0.001)	0.009*** (0.001)	0.006** (0.003)
Year Dummy: 2001	0.005*** (0.000)	0.006*** (0.001)	0.024*** (0.002)
Year Dummy: 2002	0.002** (0.001)	0.014*** (0.001)	0.048*** (0.003)
Year Dummy: 2003	-0.020*** (0.001)	0.038*** (0.002)	0.068*** (0.006)

Year Dummy: 2004	-0.014*** (0.002)	0.038*** (0.003)	0.099*** (0.007)
Instrument : Log of Synthetic SEHI Tax Price	0.439*** (0.004)	-0.037*** (0.007)	
Instrument : Log of Synthetic WSHI Tax Price	-0.089*** (0.003)	0.169*** (0.005)	
Constant	0.642*** (0.038)	-0.057*** (0.016)	0.909*** (0.133)
Number of observations	178,649	178,649	178,649
Shea Partial R ²	0.089	0.008	
Partial R ²	0.069	0.006	
F(2,178630)	6597.1	540.2	
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%