Do Tax Rate Cuts Encourage Entrepreneurial Entry?

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Abstract

Policy makers have long been interested in whether tax policies can be used to encourage entrepreneurial activity, but prior studies have produced ambiguous results. We use a twelve-year panel of tax return data to examine the effects of tax rates on entrepreneurial entry. We calculate household-level tax rates and employ multiple measures of entrepreneurship. Our results offer convincing evidence that cuts in relative tax rates faced by entrepreneurs, either in the form of higher rates for wage workers or lower rates for entrepreneurs, increase entry. The magnitudes of these effects suggest that an across-the-board tax cut would increase entry.

JEL Codes: H25, H3, L26

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Introduction

Entrepreneurs are of particular interest to researchers and policy makers as they are thought to play a vital role in the economy, providing much of the energy behind job creation, technological advancement and overall economic growth. In this paper, we address whether marginal tax rates, which we view as clear and visible tools available to policy makers, affect decisions to enter an entrepreneurial activity. We contribute to a growing body of theoretical and empirical literature that has sought to address this issue.

In any study of entrepreneurship, the first challenge is deciding how to measure entrepreneurial activity. Entrepreneurship as a concept cannot actually be directly measured; nearly every individual has some element of the entrepreneurial spirit within. Like all earlier studies, then, we must resort to a measurable proxy for entrepreneurship. Most studies have examined individual responses on surveys to questions regarding self-employment activity. We follow the more recent approach by using federal individual income tax return data to identify entrepreneurs by the presence of one or more forms of entrepreneurial income, such as income from a sole proprietorship, partnership, or small business corporation, as described in more detail below. Henceforth, our use of the terms "entrepreneur," "entrepreneurship," and "entrepreneurial activity" refer to this more limited but measurable concept.

Tax rates potentially affect decisions about whether to enter into the entrepreneurial sector or remain in the wage-and-salary sector because the tax system treats entrepreneurial income differently than wage-and-salary income. Two examples of this differential treatment were noted by Goode (1949). First, many expenses related to the entrepreneurial venture are deductible in calculating taxable income, and business deductions for goods such as automobiles and computer equipment are likely to have consumption benefits outside of business use.

Alternatively, the inability of certain entrepreneurs—namely the self-employed—to deduct expenses on services (such as health insurance prior to 1987), generally paid out of pre-tax dollars for wage-and-salary workers, might deter entrepreneurial entry.

Second, the taxation of many forms of entrepreneurial income depends upon voluntary compliance, while most wage-and-salary tax payments are withheld by employers. This allows relative tax burdens to vary even when entrepreneurs and wage-and-salary workers face the same tax rates for three reasons. First, entrepreneurs might not be aware of their actual tax burden and might mistakenly underreport their income or neglect to report certain information, or they could face significantly higher compliance costs even if they report the appropriate level of income.[1] Second, they might be prompted to seek professional assistance with their taxes, thereby increasing the likelihood that they learn about legal ways to reduce their tax burden.[2] Finally, some entrepreneurs might attempt to engage in tax evasion by willfully misreporting income or expenses or simply failing to file a tax return.

We use a twelve-year panel of tax return data to examine the effects of tax rates on entrepreneurial activity. This yields several advantages over previous research. First, our data represent the most accurate publicly-available panel of individual tax returns. We use this information to generate household-level tax rates. Use of tax data also eliminates the need to rely on self-reported survey responses to identify entrepreneurs as we can precisely define what we mean by entrepreneurship and alter this definition to test the robustness of our results. We also expand on previous work by recognizing that many entrepreneurial households also receive

[1] The complexity of the tax code is well-known, and recent research suggests that compliance costs are relatively higher for entrepreneurs who run small businesses. Crain and Hopkins (2001) estimate that tax compliance costs per employee in small businesses range from 1.8 times greater than large firms in the service industry to 4.5 times greater than large firms in the manufacturing industry. Also see Hopkins (1995).

[2] Our data indicate that entrepreneurs are indeed more likely to use the services of a paid tax preparer. Between 68 percent and 76 percent of entrepreneurs used paid preparers between 1982 and 1988 while only 37 percent to 45 percent of non-entrepreneurs used a paid preparer. All differences are statistically significant at the 1 percent level.

wage-and-salary income and addressing whether the effects differ by degree of entrepreneurship (e.g. full-time versus part-time). Our analysis of households also includes a broader set of entrepreneurs than prior work, which has typically limited the sample to working-age male household heads.[3] Ultimately, we find convincing and robust results suggesting an effect opposite from much of the previous literature including the most closely related work by Bruce (2000), but consistent with recent evidence on entrepreneurial exit decisions (Gurley-Calvez and Bruce, 2008).

Our empirical specification expresses entrepreneurial entry as a function of the marginal tax rate a filer would face as an entrepreneur and the tax rate he would face as a wage worker, as well as a vector of other control variables. We find that marginal tax rates have important and consistent effects on entrepreneurial entry decisions. Results show that cuts in marginal tax rates faced by wage workers decrease the probability of entry, while cuts in marginal tax rates faced by entrepreneurs increase the probability of entry. The effects from changes in the entrepreneurial marginal tax rate are larger than those of the wage-sector marginal tax rate, suggesting that an across the board tax cut would increase entrepreneurial entry.

U.S. Tax Policy toward Entrepreneurs

Since its inception, the U.S. tax system has treated income from wage-and-salary employment and entrepreneurship (mainly sole-proprietorship) differently. This distinction has been necessary due to the lack of a third party—the firm—in the tax collection process for many entrepreneurs. While wage-and-salary workers have income and payroll taxes withheld by their

[3] As with all of the literature on this subject, our measures of entrepreneurial activity are undoubtedly imperfect in some respects. In our determination, though, the precision of the tax-based measures is preferable to survey responses and we employ a more robust set of proxies than previous work. In addition, we elect not to further limit our definitions of entrepreneurship based on relative income or losses as it is unclear that income is an accurate reflection of entrepreneurial intensity.

employers, entrepreneurs must remit their own taxes. Despite this fundamental difference in tax collection, marginal federal individual income tax rates are, at least after tax preferences, blind to the source of income (i.e., a separate system of statutory marginal rates does not exist for income from sole proprietorships or other entrepreneurial ventures).

Entrepreneurial income has historically received different payroll tax treatment. Income from wage-and-salary employment has been subject to a payroll tax since 1937, its proceeds serving as the primary funding for the Social Security and Medicare systems. Generally, a percentage of a worker's earnings (up to some maximum taxable amount) is withheld, and that percentage is matched by the employer. The only form of entrepreneurial income that is explicitly subject to payroll taxation is self-employment income, which was not subject to a payroll tax until 1951. From 1951 through 1984 self-employment income was subject to a tax that was at most one-and-a-half times the employee's half of the combined wage-and-salary rate.

Beginning in 1984, in an effort to equalize the treatment of wage-and-salary and self-employment income, the statutory self-employment payroll tax rate was set equal to two times the wage-and-salary rate. Essentially, self-employed individuals were made liable for payroll taxes equal to the employer plus employee shares for wage-and-salary individuals. While tax credits were used to phase in the change from 1984 to 1990, this series of events represents a dramatic change in the relative tax treatment of self-employment income, a key source of income for many entrepreneurs.[4]

[4] In a further effort to equalize the treatment of wage-and-salary and self-employment income, as of 1990 the self-employment payroll tax applies to only 92.35 percent of self-employment earnings, and half of the self-employment taxes due may be deducted in the computation of adjusted gross income (AGI). The gross, pre-credit, statutory social security tax rates for wage-and-salary (employer plus employee contribution) and self-employment have been identical since 1984.

Coupled with these changes in the payroll tax system during the 1980s was a significant, although perhaps less dramatic, change in relative income tax treatment. For both wage workers and entrepreneurs, tax rates were reduced and the tax base was broadened as a result of major federal tax reforms in 1981 and 1986. Toward this general end, a number of limitations on deductible business expenses were passed.[5] Other fringe benefits, often paid for in wage-and-salary jobs out of pre-tax dollars, are still not deductible in self-employment. Further, before 1987, the self-employed could not deduct health insurance costs on their income tax returns. Conversely, more liberal provisions relating to the business use of one's home made entrepreneurial activity more attractive during this time. Each of these policy changes represents a change in the tax treatment of entrepreneurs relative to similarly-situated wage workers.

Despite some small gains, the payroll and income tax changes during the 1980s rendered entrepreneurship significantly less tax-advantaged relative to wage-and-salary employment. Indeed, the overall theme of the 1980s tax changes and most notably the Tax Reform Act of 1986 was to level the playing field for various types of taxpayers. These changes in the Federal tax code—along with substantial variation at the state and individual levels—provide ample exogenous policy variation to analyze sensitivity to tax policies among potential entrepreneurs. [6]

Prior Studies of the Taxation of Entrepreneurs

[5] While tax rate changes affected both wage workers and entrepreneurs similarly, relative definitions of taxable income changed during this time. For example, while the Economic Recovery Tax Act of 1981 brought such benefits as accelerated depreciation allowances and an investment tax credit which reduced taxable income for entrepreneurs, these and other similar provisions were either scaled back or eliminated by subsequent legislation including the Tax Reform Act of 1986 (TRA86). Further, TRA86 brought substantial base broadening measures such as reductions in the deductibility of expenses for meals and entertainment. An exhaustive discussion of the changes in relative tax treatment during the 1980s is beyond the scope of this paper; interested readers should consult Steuerle (2004) and the references therein for an excellent first-person account of the many tax changes implemented during this time.

[6] Indeed, variation in state rates can be extreme in the cross-section since several states do not impose a tax on individual income.

Previous research on the effects of tax policy on entrepreneurial activity consists of two main theoretical approaches and a body of empirical work which has flourished in recent years due in part to the availability of vast longitudinal databases. Theoretical models have focused on two different dimensions of the tax system, the effects of tax policies on the relative risk of the entrepreneurial sector through loss offsets (Bruce, 2000 and 2002; Cullen and Gordon, 2007) and the potential benefits of evasion (Watson 1985, Kesselman, 1989). In both cases, the theoretical results are ambiguous.

Given the theoretical ambiguity, it is perhaps unsurprising that despite a growing empirical literature on the economic effects of taxes on entrepreneurship, little consensus has arisen. [7] Most of the early empirical studies concluded that higher federal tax rates lead to higher rates of self-employment. Based on the theoretical literature, higher tax rates might lead to more self-employment for two reasons. First, higher tax rates increase the benefits of tax evasion and evasion is more likely in the entrepreneurial sector given the absence of third party reporting. Second, a higher tax rate reduces not only the expected return from entrepreneurial activity, but also reduces the risk of the entrepreneurial venture by compressing the distribution of after-tax returns through loss offsets. Further, the increase in expected loss offsets makes reporting entrepreneurial income through the personal income tax system relatively more attractive than filing a corporate tax return, which might also increase the number of self-employed (Cullen and Gordon, 2007). However, there are significant problems in the early literature as none of these studies included separate tax rates for income from the two sectors (entrepreneurship and wage-and-salary), they often used econometric techniques that have since been found to be

[7] See Schuetze and Bruce (2004) for a more detailed summary of the literature on taxes and self-employment.

problematic,[8] were restricted by the use of aggregate cross-section or time series data rather than panel data,[9] did not address potential tax rate endogeneity or used aggregate tax information—such as statewide average tax rates—to avoid the issue, and most relied on self-reported survey responses to identify entrepreneurs.

Somewhat surprisingly, the general positive relationship between tax rates and self-employment rates continued to hold in later studies that addressed the econometric limitations, including cointegration, of the earlier work.[10] However, the finding that higher tax rates lead to more self-employment has not been confirmed by subsequent cross-section and time series analyses.[11] As one example, while Robson and Wren (1999) found that self-employment increased with average tax rates, they found an opposite effect of marginal tax rates. Results from panel data studies are also inconsistent and have indicated that higher tax rates on self-employment income might either increase or decrease self-employment rates.[12]

Cullen and Gordon (2007) used repeated cross-sections of U.S. tax return data from 1964 to 1993. They echoed the general finding from the earlier literature that cutting personal tax rates can reduce the extent of entrepreneurial activity. However, their focus was on a much more limited definition of entrepreneurship than those found in most other analyses.[13] They also used aggregate (averaged) tax measures to avoid concerns of tax rate endogeneity.

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[8] Specifically, they typically involve the use of ordinary least squares regression analysis, with simple corrections for the common problem of autocorrelation (i.e., where observations in the time series data are related in some way over time). See, for example, Long (1982a) and Blau (1987).

[9] See Long (1982a), Long (1982b), or Moore (1983).

[10] See Parker (1996), Robson (1998) and Robson and Wren (1999).

[11] See Fairlie and Meyer (1998), Briscoe, Dainty, and Millett (2000), and Bruce and Mohsin (2006) for examples of more recent time series estimation and Parker (2003) for more recent cross-section research.

[12] Panel studies include Bruce (2000 and 2002), Schuetze (2000), Gentry and Hubbard (2000), Moore (2003), and Cullen and Gordon (2007).

[13] Cullen and Gordon (2007) focus on entrepreneurship as indicated by the presence of a non-corporate loss from a proprietorship, partnership, or subchapter S corporation that was larger than 10 percent of reported wage-and-salary income. They further restricted their analysis to tax returns filed by single individuals.

Most closely related to our analysis, Bruce (2000) used U.S. data from the Panel Study of Income Dynamics and included separate tax rates for entrepreneurial and wage-and-salary income. He showed that decreasing an individual's expected *marginal* tax rate in self-employment (holding the wage tax rate constant) reduced the probability of entry, while a similar decrease in the *average* self-employment income tax rate increased this probability. These results are at least partially explained by the fact that changes in differential tax treatment, while having the primary effect of altering net returns to labor, also affect the incentives to capture relevant tax preferences (or to evade or avoid taxation altogether).

Our research builds upon more than twenty years of research the earlier literature in a number of important ways. We make several innovations in addition to combining valuable contributions from several previous studies. We use a previously unexplored rich panel of tax return data to calculate household-specific income and payroll tax rates and to avoid relying on self-reported survey responses to identify entrepreneurs. Tax return data also provide a unique opportunity to test the robustness of our results by considering multiple definitions of entrepreneurship. Extending the previous research, we calculate more accurate tax rates by accounting for the fact that many entrepreneurs also have wage-and-salary income and we address whether the effects differ for households that enter into entrepreneurship entirely (have no wage-and-salary income).[14] We follow the most recent literature and consider separately the tax treatment of wage workers and entrepreneurs, we examine *transitions* into entrepreneurship, and we address the likely endogeneity of individual-level tax rates by making use of exogenous

[14] On average from 1979 to 1990, 53 percent of single, entrepreneurial filers also had wage income ranging from a low of 50 percent in 1979 to a high of nearly 57 percent in 1989. The omission of wage income for entrepreneurial households filing joint returns is potentially more serious. An average of 77 percent of married (including married filing separately) entrepreneurial households had positive wage income ranging from a low of 73 percent in 1979 to a high of nearly 80 percent in 1990.

variation in tax rules to construct valid instrumental variables. Perhaps most importantly, our results are convincing and robust to a number of specification changes and sample restrictions.

Illustration of the Entry Decision

A simple illustration serves as an example of the forward-looking decision to enter into an entrepreneurial activity in the next time period based on information available today and expected after-tax income in each sector. Insights from the illustration are also potentially useful for interpreting the conflicting empirical evidence. Consider an agent at time *t* deciding whether to enter an entrepreneurial activity at time *t+1*. Combining elements from the two strains of theoretical research, our agent must allocate work effort between the wage-and-salary sector and a relatively risky entrepreneurship sector (Bruce, 2000 and 2002; Cullen and Gordon, 2007) as well as decide how much entrepreneurship income to report to the tax authority (Watson 1985, Kesselman 1989; Pestieau and Possen, 1991).[15]

More formally, let ε represent the share of labor allocated to entrepreneurial activity and $(1-\varepsilon)$ is the share allocated to the wage job. The wage rate per unit of time is ω and the uncertain return to entrepreneurial activity is s, which is assumed to be normally distributed with a mean of μ_s and a variance of σ_s^2. In addition, there is an individual-specific cost to entry (f_i) that depends on the amount of time allocated to entrepreneurial activity. For example, participating in an entrepreneurial activity for five hours a week is unlikely to disrupt wage work. However, a commitment of 30 hours per week likely means severing or seriously altering ties to

[15] In isolation, both theoretical approaches produce ambiguous results. In the relative risk framework, a change in the tax rate has two different effects. First, the higher relative rate reduces the returns to the entrepreneurial venture relative to wage-and-salary work, decreasing the likelihood of starting an entrepreneurial activity. Conversely, if loss offsets are allowed, an increase in the relative tax rate compresses the post-tax distribution of returns from entrepreneurial activity and thus reduces the risk of entrepreneurial ventures. The other theoretical approach highlights the increased opportunity for evasion due to the absence of a third-party to report income or expenses on behalf of many entrepreneurs. The tax effects in these models depend crucially on risk attitudes.

the wage-and-salary sector and might involve losing benefits and professional interaction.

Marginal tax rates are represented by τ_w (wage income) and τ_s (entrepreneurial income). In this framework, marginal tax rates are equal to average tax rates. While we focus our empirical work on marginal tax rates for the reasons outlined below, average tax rate results are also estimated for baseline specifications. While wage income is perfectly monitored by tax authorities (due to third-party reporting), entrepreneurial income is subject to voluntary compliance. Abstracting from legal tax avoidance behavior and focusing on illegal tax evasion, the individual reports a share of entrepreneurial income equal to θ. If evasion is detected, a penalty rate of ρ is applied to the amount of evaded income.

With this, the individual's income is $I = \omega(1-\varepsilon)(1-\tau_w) + \theta s\varepsilon(1-\tau_s) + (1-\theta)s\varepsilon - f_i\varepsilon$ if not audited and $I = \omega(1-\varepsilon)(1-\tau_w) + \theta s\varepsilon(1-\tau_s) + (1-\theta)s\varepsilon - (\tau_s + \rho)(1-\theta)s\varepsilon - f_i\varepsilon$ if he or she is audited and evasion is detected. Letting π equal the (known) probability of audit, expected income net of taxes is equal to

$$\omega(1-\varepsilon)(1-\tau_w) + \mu_s\varepsilon(\theta\alpha + \lambda) - f_i\varepsilon \qquad (1)$$

where $\alpha = \pi(\tau_s + \rho) - \tau_s$ and
$\lambda = 1 - \pi(\tau_s + \rho)$.

The individual maximizes utility by deciding how much labor to allocate to entrepreneurship (ε) and what percentage of entrepreneurial income to report (θ). In the spirit of Cullen and Gordon (2007), the individual's utility depends on the expected value and variance of income:

$$U(I) = E(I) - \beta(\theta\alpha + \lambda)\,\mathrm{var}(I) \qquad (2)$$

Note that utility generally falls as the variance of income increases but β is included to account

for heterogeneity in risk preferences.[16] The variance of income (where income is weighted by the probability of audit) is $\varepsilon^2\sigma_s^2(\theta\alpha+\lambda)^2$.

The utility maximizing levels of θ and ε are as follows:

$$\theta = \left[\frac{3(\omega(1-\tau_w)+f_i)}{\mu_s\alpha} - \frac{\lambda}{\alpha}\right] \tag{3}$$

$$\varepsilon = \frac{\mu_s^3}{3^3\beta\sigma_s^2\left[\omega(1-\tau_w)+f_i\right]^2} \tag{4}$$

This simple framework provides several interesting insights the effects of tax rates on the decision to enter an entrepreneurial activity. First, at an interior solution, the equilibrium level of entrepreneurial activity (ε) is only a function of the tax rate on wage income, an increase in which unambiguously increases entrepreneurial effort.[17] Individuals alter their reporting activity (θ) in response to changes in the tax rate on entrepreneurial income, not the amount of real entrepreneurial activity.[18] An implication of this result is that an empirical analyses using different measures of entrepreneurship (reporting activity (θ) vs. entrepreneurial effort (ε)) might be expected to yield different results depending on the tax rate(s) used. Consider an analysis where entrepreneurial effort (ε) serves as the dependent variable and just one tax rate (τ) is used instead of separate rates for wage income and entrepreneurial income. Our decision example above would predict a positive effect of taxes on entrepreneurial effort although the effect is functioning merely through the wage tax rate. Thus, if entrepreneurial effort (ε) is captured in survey data, this prediction is consistent with much of the previous literature that has found a

[16] The additional term used to scale the variance is simply a convenient combination of the model's parameters intended to simplify subsequent calculations.

[17] $\dfrac{\partial\varepsilon}{\partial\tau_w} = \dfrac{3^3\beta\sigma_s^2\omega}{3^3\beta\sigma_s^2\left[w(1-\tau_w)+f_i\right]^2} > 0$.

[18] This result arises as the household optimally chooses both the level of entrepreneurial activity and the percent of entrepreneurial income it reports. In essence, the household adjusts the effective tax rate on entrepreneurial income so the statutory rate, or full-compliance rate, is of little consequence in labor allocation decisions.

positive relationship between taxes and entrepreneurial activity using one aggregate tax rate instead of separate rates based on employment sector.[19]

Results regarding reporting activity (θ) and tax rates are not as straightforward but most plausibly suggest that the entrepreneurial tax rate will have a negative effect on entrepreneurial entry. Both tax rates affect the optimal level of reporting activity and the partial derivatives can take any sign. However, some conclusions are possible using reasonable parameter values and assuming taxpayer data. Only households with positive reported entrepreneurial income, $\theta > 0$ (which also requires that unobserved $\varepsilon > 0$), are observed as entrepreneurs and those with $\theta = 0$ (which does not necessarily imply that $\varepsilon = 0$) are observed as non-entrepreneurial in tax return data. Thus, factors including the tax rate on wage income (τ_w) that increase the likelihood of a positive θ are associated with increased entrepreneurship.[20] Intuitively, as τ_w increases, the individual responds to the lower relative returns to labor income by reducing the uncertainty associated with entrepreneurial income (due to the possibility of audit). Conversely, θ is less likely to be positive the higher the entrepreneurial tax rate (τ_s).[21]

This simple illustration highlights how different datasets (one measuring ε and one measuring θ) might produce opposite conclusions about the effects of taxes on entrepreneurial activity. Using tax return data, one would expect to find a positive relationship between the tax on wage income and entrepreneurial activity and a negative relationship between the tax rate on

[19] However, this is not true for Bruce (2000) who used survey data but separate entrepreneurial and wage income tax rates. In this case, our illustration would have predicted no relationship between the tax rate on entrepreneurial income and entrepreneurial activity instead of the positive result found by the author.

[20] Note that this requires $\frac{3(\omega(1-\tau_w)+f)-\mu_s\lambda}{\mu_s\alpha} > 0$. Reasonable parameter values produce $\alpha < 0$. For example, with a probability of audit (π) of 0.03 and a marginal tax rate on entrepreneurial income (τ_s) of 0.28, any penalty rate (ρ) less than 9.05 (more than 32 times the tax rate) produces a negative α. Thus, a positive θ requires $\mu_s\lambda > 3(\omega(1-\tau_w)+f)$.

[21] Theta is positive when $\mu_s(1-\pi(\tau_s+\rho) > 3(\omega(1-\tau_w)+f)$ and increasing τ_s makes the inequality more likely to hold.

entrepreneurial income and entrepreneurial activity, consistent with our empirical findings.[22] Using survey data and including only one tax rate measure, one would expect to find that taxes increase entrepreneurial activity, consistent with much of the prior literature.

Description of Data

The data for this research are drawn from the University of Michigan Tax Research Database. In constructing this panel data file, the Office of Tax Policy Research (OTPR) at the University of Michigan acquired the public-use tax return data released by the Internal Revenue Service (IRS) Statistics of Income (SOI) Division and converted them to user-friendly format. The 1979-1990 panel is constructed from annual IRS-SOI Individual Tax Model Files, which contain up to 200 pieces of information for between 80,000 and 250,000 personal income tax returns in each year. Within each Individual Model File is a subset of returns that were randomly selected to be part of a panel of taxpayers whose returns would be drawn year after year. In total, the panel includes data from over 200,000 tax returns. Approximately 6,000 filers are present in the panel for all 12 years.[23]

While the time period of the OTPR tax panel could be perceived to be a bit outdated, this data file is the best publicly available longitudinal tax return data set. It also directly overlaps the time period used in the most similar prior study (Bruce 2000). Further, it encompasses a number of significant tax policy changes, providing the necessary exogenous variation for identification purposes. Examining entrepreneurial sensitivity to changes in tax policy during this window will be instructive for analysis of current and future policies. The major drawback of using tax return

[22] This relationship does not hold in the work of Cullen and Gordon (2007) but their sample is restricted to entrepreneurs with significant losses and it is unclear how such a restriction would affect the implications of the above illustration.

[23] Note that amended returns filed in later years are reassigned to the appropriate tax year.

data—lack of detailed demographic information—is discussed in greater detail below along with variables that are likely to provide at least rough proxies for the missing information.

The panel of tax return data allows precise definitions of entrepreneurship based on filing status (e.g., presence of a Schedule C) and reported sources of entrepreneurial income instead of self-reported survey responses.[24] The tax panel also includes more detailed tax-related information than survey data. In addition to filing status and entrepreneurship variables, the data include detailed information on income from all sources including wages and salaries, sole proprietorships (and other forms of entrepreneurship), dividends, and transfers.

One of the most important advantages of using tax return data is access to multiple categories of entrepreneurial activity at the individual level. We use this advantage to test the robustness of our results to the measure of entrepreneurship, an option not available in most of the previous literature. We begin with the most straightforward definition of entrepreneurship: sole proprietorships (as evidenced by the presence of a Schedule C).[25] We refer to this as Measure 1. We also explore two increasingly broader definitions of entrepreneurship. Measure 2 adds to Measure 1 those with income from partnerships or subchapter S corporations.[26] Finally, Measure 3 adds to Measure 2 those filers with rental or royalty income. Survey data typically capture the first two of these as "self-employed," but researchers often omit those in the latter categories (rent and royalty income) as "partially" entrepreneurial. These measures mirror

[24] This is a valuable contribution as biases in survey responses could be particularly large for self-reported entrepreneurship status. Blanchflower and Oswald (1998) found that a majority of individuals report a desire to be self-employed but a small number actually achieve this goal. A desire on the part of respondents to be entrepreneurs coupled with differing definitions entrepreneurial activities might diminish the precision of survey classifications.

[25] We measure entrepreneurial activity by the presence of a Schedule C and do not attempt to measure the scale of the entrepreneurial activity. To be sure, this measure is potentially problematic. For example, if a household is participating in an entrepreneurial activity but not reporting any income (filing a Schedule C for Measure 1), we do not classify them as entrepreneurial. To the extent that households begin entrepreneurial activities and choose not to report the activity to the taxing authority, our measure understates entrepreneurial entry. Conversely, if a household has been engaged in an entrepreneurial activity and not filing a Schedule C then begins to file a Schedule C for any reason, we identify them as entrepreneurial, overstating entry.

[26] Partnership, subchapter S corporation, and rent and royalty income are determined from entries on Schedule E.

some of those explored by Bruce and Holtz-Eakin (2001). It should be noted that the data pertain to individual entrepreneurs and not to their entrepreneurial businesses or enterprises.

To be sure, indicators of entrepreneurial activity drawn from tax returns could lead us to include casual or partial entrepreneurs or independent contractors, but this is also true of the survey-based measures of such things as self-reported self-employment status used in much of the prior literature. Unfortunately, neither tax data nor survey data provide sufficient data to identify such individuals in a universally acceptable manner. It is also not clear how excluding them might impact empirical results.

Given that our data are at the tax filer level, separating the sample by marital status seems necessary on at least two grounds.[27] First, for single filers, the data represent individual as well as household level decisions. Examining single filer entrepreneurship behavior yields results more closely comparable to a number of earlier studies, which focused on self-employment activity using individual survey data. In addition, single filers are likely to be younger on average with larger variations in income. This might make single households more willing to undertake the risk of entrepreneurship. Willingness to undertake risk might also be greater for single filers as they are likely to have fewer dependents. Conversely, lack of credit history might make single filers more likely to be liquidity-constrained, decreasing the probability of entry.

We define entry as having no entrepreneurial activity (e.g., Schedule C) on one year's tax return but having some entrepreneurial activity on the next year's return. Entry rates (Figures 1 through 3) generally rose over the 1980s and seem to have reacted to the increased relative payroll taxation of sole-proprietors enacted in 1984—all series show a slight decrease in entry around this time. Unsurprisingly, entry rates for the single filers (Figure 3) are particularly

[27] Returns are compressed into two categories, married (joint) including those whose filing status is married or married filing separately, and single including returns filed as unmarried (single), head of household or widowed.

volatile. This general increase in entry rates is consistent with the overall increase in entrepreneurship during the 1980s. [28]

Empirical Methodology

Using tax return data, we are unable to examine entrepreneurial effort (ε) but are able to examine reporting behavior.[29] We estimate discrete choice models of the following form to examine the effects of tax rates on a tax filer's entrepreneurial entry decision:

$$D_{i,t+1} = \beta' X_{i,t} + \gamma T_{i,t+1} + \mu_i + \upsilon_{i,t+1}\,, \qquad (3)$$

where $D_{i,t+1}$ is a binary variable that takes a value of 1 if an individual transitions from no entrepreneurial activity at time t to having entrepreneurial activity at time $t + 1$ (and zero if the household remains non-entrepreneurial in both t and $t + 1$). The forward-looking nature of the entrepreneurial decision is reflected in our specification; households make the decision to become entrepreneurial in $t + 1$ based on information available at time t and their expected tax rates for the next period. Note that this results in a two-year transition period (the filer must be a potential entrant at time t and present in years t and $t+1$ to be included in the analysis). Transition periods are pooled for the analysis, meaning that each entry is treated as a separate transition. Multiple entries by a household do occur in the data but are not common and previous research suggests that controlling for initial condition does not affect the empirical results (Bruce, 2000). Almost 90 percent of the 4,495 filers with an entry into an entrepreneurial activity had only one entry. [30]

[28] See Bruce and Gurley-Calvez (2008) and Bruce and Holtz-Eakin (2001).
[29] More precisely we observe the interaction between entrepreneurial activity and reporting behavior as one must presumably have entrepreneurial activity before deciding what portion of income to report. In the extreme case, where tax rates have no effect on real entrepreneurial effort, but only affect reporting behavior, our results are useful for determining the revenue effects of tax rate changes.
[30] Roughly 9 percent entered twice and 2 percent of households entered three or four times (no household had more

$X_{i,t}$ is a vector containing a constant and a set of exogenous control variables defined as of time t. Expected post-transition tax rates are calculated separately for each household, discussed in greater detail below, and included in $T_{i,t+1}$. Coefficients on the two tax variables are used to test the prediction that entrepreneurial entry increases with the wage sector tax rate and decreases with the entrepreneurial tax rate. In our empirical specification, the tax rates are household-specific effective marginal tax rates so that earnings are implicitly included in the tax rate.[31]

We focus our main analysis on marginal tax rates. In our sample more than half of single filers and nearly three quarters of married filers have both wage and salary and entrepreneurial income. The entry decision is more likely to represent a reallocation of time rather than a discrete change from wage and salary employment to entrepreneurship, making the marginal tax rate most appropriate, especially for married households. In our robustness checks we restrict the analysis to those who enter entrepreneurship full-time (have no wage and salary income) and replace marginal tax rates with average tax rates.

The error term in this equation includes an individual-specific time-invariant random effect (μ_i) to capture unobserved individual heterogeneity, including individual specific entry costs (f_i), and an independently and identically distributed residual component ($\upsilon_{i,t+1}$) with zero mean and finite variance. Year dummies are included to capture audit and penalty rates set at the federal level and changes in macroeconomic conditions. A convenient empirical specification for the above equation is a random effects probit, as in Bruce (2000 and 2002).[32]

Estimating Tax Rates: We assess the effects of taxes on entrepreneurial entry by

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than 4 entries).

[31] Other changes in the tax code, such as changes in depreciation rules, are implicitly included in our tax rate calculations to the extent that they impact effective marginal tax rates.

[32] Most of the existing empirical literature follows the custom of limiting the sample to male heads of household who are of prime working age (25-54). Due to the lack of demographic information, it is not possible to limit our sample in such a fashion. However, separate analyses are conducted for married and single households. In the case of a single filer, the household entrepreneurship decision is equivalent to the individual decision.

calculating the tax rates faced by a household in each of the two outcomes: entrepreneurship and wage employment. Our assumption is that the decision to enter an entrepreneurial venture includes a comparison of one's expected tax situation in the wage and entrepreneurial sectors.[33] Of course, we only observe one of these outcomes and must estimate hypothetical tax rates for the alternative sector following Bruce (2000 and 2002). For example, for a tax filer that enters entrepreneurship we can easily (and accurately) estimate their expected entrepreneurship tax rate by examining their actual *ex post* income. We then estimate their hypothetical wage-sector tax rate—the tax rate that they would have faced if they had not entered the entrepreneurial activity. Conversely, for those who do not enter, we use their actual wage-sector tax information but estimate their hypothetical entrepreneurial sector income accordingly.

Our rationale for taking this approach is quite straightforward. In the ideal scenario, we would have individual-specific expected tax rates that would apply in each of the two possible outcomes. That being impossible, we simply apply a perfect foresight strategy where actual information is used when possible and "best guess" information is used otherwise. Specifically, the "best guess" information is derived from others in the labor market who actually selected that particular sector. In reality, the implications of this strategy for our estimation are not as significant as one might expect, mainly because predicted incomes are used only in the process of generating estimates of marginal tax rates. Given the bracket structure of the income tax, a range of income estimates can yield the same marginal tax rate estimate.

We improve upon earlier research by recognizing that many filers with entrepreneurial income also report wage-and-salary income. Ignoring this wage-and-salary income would

[33] For certain types of entrepreneurial activity such as S-corporations and some partnerships, it is feasible that the relevant comparison should be between individual and corporate tax rates. Since the federal corporate income tax is essentially a flat-rate system, and since we include year fixed effects in our estimation, we do not include the corporate income tax rate as a control variable.

provide an inaccurate assessment of that filer's tax situation. In terms of estimation, this requires predicting wage-and-salary income as well as entrepreneurial income for those who do not enter entrepreneurship. Recall that entrepreneurship is defined by the presence of entrepreneurial income, regardless of whether or not the filer also reports wage-and-salary income.

Our strategy for predicting income is to run ordinary least squares (OLS) regressions of observed income for a given sector on a constant, non-labor income, and a set of household specific control variables including proxies for age and the number of children in the tax filer's household. These regressions are estimated separately by year and filing status (single and married), and are repeated for each of the three measures of entrepreneurship. Estimated coefficients are then used to predict incomes for tax filers in the alternative sector. We emphasize that these income regressions and subsequent predictions are only used to estimate tax rates. Even if income is predicted with error, the progressive bracket structure of the federal income tax will reduce the measurement error in the estimated tax rates. Rather than present the regression results for all of these models, we provide plots of average actual and predicted incomes for the first entrepreneurship measure (Schedule C) in Figures 4 through 9.[34]

The Figures suggest that, on average, the income predictions are quite reasonable. The predicted incomes for those unobserved in a particular sector track the incomes of those observed in that sector fairly closely. One would not expect the values to correspond perfectly as there are likely to be systematic differences between households that self-select into an employment sector and those that do not. Adding credence to this observation, the actual and predicted values tell a consistent story about the earnings potential of the wage-and-salary and entrepreneurial filers; entrepreneurial filers are almost universally expected to have higher incomes.

[34] Full results from the income-prediction regressions are available upon request from the authors.

In Figure 4, the predicted hypothetical wage earnings for single, entrepreneurial filers are higher than the actual wage earnings observed for those without entrepreneurial income. Predicted wage and entrepreneurial incomes for single filers in the wage sector were lower than the actual values among entrepreneurial filers (Figures 5 and 6). These patterns were nearly identical for married filers (Figures 7 through 9) suggesting that households with the highest earning potential are self-selecting in entrepreneurship. In light of the similarities between actual and predicted incomes and the consistency of differences, we are confident that our income predictions result in accurate estimates of the relevant tax rates.

With the income estimates in hand, we then estimate tax rates by running a set of 17 variables from the tax returns through the National Bureau of Economic Research's TAXSIM model.[35] We calculate two tax rates for each filer: their actual tax rate depending on their chosen sector, and their hypothetical tax rate in the alternative sector.[36] State income tax rates are also calculated by the TAXSIM model and are included in the analysis. Following the most

[35] TAXSIM can be thought of as a virtual tax form or calculator which can take limited information estimate effective tax rates. Federal tax rates can be estimated for tax years back to 1960, and state tax rates can be estimated for tax years back to 1977. The user supplies as much detail as possible in the required data fields, and all other necessary inputs are estimated using historical data. Variables used in the TAXSIM calculations are outlined in Appendix Table 1. TAXSIM is accessible at http://www.nber.org/taxsim. For more details, see Feenberg and Coutts (1993).

[36] For purposes of comparability, we elect to use TAXSIM-calculated tax rates for both outcomes rather than making use of the actual tax rates that are provided (for the chosen outcome only, of course) in the tax return data. Note that the calculated tax rates are actual tax rates, inclusive of evasion. We have implicitly assumed that the tax paid on the next dollar of entrepreneurship income will be equivalent to the average paid on each previous entrepreneurial dollar or equivalently, that the household's average evasion applies to the next dollar earned. In the case that the full compliance tax rate is most appropriate for the analysis, we have underestimated entrepreneurship tax rates and overstated the gap between wage-and-salary and entrepreneurial tax rates. Alternatively, it might be the case that a household decides not to report any portion of the next dollar earned. In this case, the appropriate entrepreneurial marginal tax rate is zero and we have understated the gap between the wage-and-salary tax rate and the entrepreneurial tax rate by overestimating the entrepreneurial marginal tax rate. The TAXSIM model allows marginal tax rates to be calculated with respect to either the primary earner's wage income or other income. Although TAXSIM instructions call for entrepreneurial income to be reported in the wage field, negative values are not permitted. However, reporting all entrepreneurial income in the "other income" field would lead to incorrect Earned Income Tax Credit (EITC) calculations. To appropriately count positive net labor earnings for EITC eligibility we add entrepreneurial income to wage earnings. If the sum of the two incomes is negative, wage earnings are offset to zero and the remaining negative amount is subtracted from other income.

recent literature, we also include estimates of individual payroll tax rates.[37] Federal and state income taxes are combined with payroll taxes to arrive at a single tax rate for each sector.

Table 1 presents some preliminary evidence that tax rates might play an important role in entrepreneurial transitions. This table shows mean values of marginal tax rates (MTRs) and average tax rates (ATRs) for both sectors, broken down by filing status and whether or not the filer entered entrepreneurship (Measure 1). Among single filers, those who did not enter enjoyed lower tax rates in the wage sector than they would have faced in entrepreneurship. Those who did enter enjoyed much lower tax rates in entrepreneurship than they would have faced in the wage sector. The same story generally holds for married filers and for ATRs, although married filers who did not enter entrepreneurship had slightly higher MTRs in the wage sector.

Additional Independent Variables: The tax return panel provides more in terms of other control variables than might be immediately apparent. We control for age by including a dummy for the presence of a special exemption for taxpayers or spouses over the age of 65. The number of exemptions for children living at home provides a proxy for household size. We also include the number of children living away from home and the total number of exemptions claimed. Aggregations of state identifiers in the tax panel are used to control for region of residence and

[37] Payroll taxes might be expected to have smaller effects on transition probabilities because the payment of Social Security and Medicare taxes is associated with clearly defined benefits. However, the time period in this analysis is characterized by relative payroll tax rate increases for the self-employed without equivalent relative benefit increases. In computing payroll tax rates for wage employment, we assume that workers are responsible for both employer and employee contributions. This assumption is in line with the tax incidence literature (Moore, 1983; Itaya, 1991; Gruber 1997). In calculating payroll tax rates for joint filers, we estimate the applicable tax rate by dividing income in half and assessing the appropriate tax rate (payroll tax rate or zero if the income is above the payroll tax cap). We correctly assign the payroll tax rate for the majority of joint filing households as they have total income below the payroll cap for a given year (68.77 percent). About 27 percent of joint filing households have total income between the payroll cap and 2 times the amount of the cap. These households are assigned the statutory payroll tax rate but may actually face a zero rate for the next dollar earned by one filer depending on the distribution on income within the household. About 4 percent of joint filing households have incomes of more than 2 times the payroll cap. These households are assigned a zero payroll tax rate but one filer might actually face the statutory rate depending on the distribution of income within the household.

year dummy variables are included to account for time effects.[38]

The presence of financial constraints limiting entrepreneurship is an often-cited argument for government intervention. For filers who itemize their deductions, we can identify the presence of a mortgage interest deduction which can be used as a source of information regarding liquidity constraints, as in Bruce and Holtz-Eakin (2001). Those with housing equity have more access to loanable funds but it might also be the case that the presence of a mortgage limits the household's ability to obtain financing as they might be near their borrowing capacity.

Risk attitudes are also thought to be an important determinant of entrepreneurial activity. In an attempt to proxy a household's risk attitude, we include the tax balance due. We include this variable as it is seems plausible that more risk-averse households would be more likely to over-withhold their taxes, thereby receiving a refund from the IRS.[39] Relatively risk-loving filers might under-withhold such that the money is available for alternative uses.

Summary statistics for the non-tax variables are shown in Table 2.[40] Note that entry rates are larger on average the more inclusive the entrepreneurship measure. Roughly one in eleven filers claims an age 65 exemption. Filers are fairly evenly distributed across the West, Midwest, and Northeast regions (South is the omitted reference category). About one-quarter of single filers and half of married filers claimed a mortgage interest deduction. Unsurprisingly, married filers reported more exemptions on average. Results for the measure of the balance due indicate

[38] Locations (such as Guam) outside of the U.S. are represented with an indicator for "other region." An indicator for "missing region" is used to indicate a return with an adjusted gross income of $200,000 or more (omitted for confidentiality reasons). Time dummy variables indicate the second year of the two-year transition period ($t + 1$). Factors that affect entrepreneurship at the macro level should be captured by these time variables. Dummy variables for state of residence are not included in the estimation as we have insufficient sample sizes at the state level.
[39] There may be a bias toward first-year entrepreneurs having a balance due if they do not pay estimated taxes throughout the year as is required for subsequent years. However, this should not affect our analysis as our filers are not entrepreneurial in the first time period (potential entrants) and we use first period balance due as our risk proxy.
[40] Additional information on variables used in the analysis can be found in Appendix Table 1.

sufficient variation for our estimation purposes, with the average filer receiving a small refund.[41]

Are Tax Rates Endogenous? Our analysis is based on the decision a household makes at time *t* to become entrepreneurial in time *t + 1*. The appropriate tax rates for making a decision are those expected in time *t + 1*. However, these tax rates are likely to be endogenous as a move from the wage-and-salary sector to the entrepreneurship sector is likely to affect this expected tax rate because employment sector and tax rates are simultaneously determined. More specifically, a household is more likely to be attracted to the sector in which they experience a higher income and higher income levels yield higher marginal tax rates. Thus, failure to account for the endogeneity of tax rates most likely creates a downward bias on the entry results.[42]

We address this potential endogeneity using the instrumental variable approach applied by Bruce (2000 and 2002). This approach requires an additional set of tax rates from the TAXSIM model. First, we calculate a set of tax rates (one for each employment sector) using time *t + 1* incomes and time *t* tax rules. These are the best approximations of the tax rates that would have existed had the tax rules remained constant. Next we calculate an additional set of tax rates using incomes and tax rules as of time *t + 1*. This second set of tax rates represent the closest approximation to actual post-transition tax rates including any policy changes that occurred between time *t* and *t + 1*. The instrumental variable is then defined as the difference between the second (using time *t+1* tax rules) and first (using time *t* tax rules) tax rates, and represents the part of the actual *t+1* tax rate that is caused by the change in the tax code only.[43]

[41] Returns to entrepreneurial and wage-and-salary activities are included implicitly in the tax rate calculations. A more direct measure, such as gross income or net profits, is not included for entrepreneurial activities as these measures do not necessarily indicate success.

[42] This is indeed borne out in the empirical results presented below. The coefficients from the instrumental variables specifications are larger than those from the uninstrumented specifications.

[43] Note that the only different input into the TAXSIM calculations is the tax year. Assuming that changes in tax policy are exogenous from the household point-of-view, we have subtracted out behavioral adjustments and are left with only the portion of the difference that can be attributed to policy change.

Two instrumental variables are constructed, the difference in the wage-and-salary tax rates and the difference in the entrepreneurship tax rates. These instrumental variables are entered separately into two first-stage panel regressions, one for each potentially endogenous tax rate.[44]

Results and Discussion

Table 3 presents our baseline analysis of entrepreneurial entry, using marginal tax rates and the first measure of entrepreneurial activity (Schedule C). Positive coefficients indicate that an increase in that variable, all else in the model held constant, is associated with an increase in the probability of entrepreneurial entry. Two sets of results are presented for each filing status, one with actual tax rates (Non-IV) and another with fitted tax rates (IV) from first stage regressions as described above.[45] However, in a series of endogeneity tests, we reject the null of exogeneity for both tax rates, for both single and married filers.[46] Therefore, we focus our discussion on the econometrically more appropriate IV results in Table 3.[47] Our results indicate that reducing the wage-sector MTR is associated with a decrease in the probability of entering entrepreneurship, while reducing the entrepreneurship MTR is associated with an increase in the

[44] This approach more closely resembles Bruce (2002). Bruce (2000) actually used a tax rate difference, defined as the wage tax rate minus the entrepreneurship (self-employment) tax rate, in his baseline analysis. We explore this approach as a robustness check below.

[45] Our use of random effects probit models makes it difficult to handle endogenous variables. No software is currently available that can easily estimate an instrumental variables probit with random effects. Consequently, we simply insert fitted values in the second-stage random effects probits. In order to obtain more appropriate standard errors, we bootstrap the random effects probit 50 times. Our initial intent was to estimate bootstrapped standard errors for all results shown in the paper, but the bootstrapping procedure proved to be extremely costly in terms of computing time. We found in the baseline entry analysis (Table 3) and the Measures 2 and 3 analyses (Table 4) that, while standard errors increased as a result of the bootstrapping procedure, patterns of significance for the tax variables were unchanged. We are therefore confident that our central conclusions would continue to hold if bootstrapped standard errors were calculated for all remaining robustness checks (Table 5).

[46] We assess the potential endogeneity of these tax rates by performing the test suggested by Rivers and Vuong (1988). This test involves inserting the potentially endogenous variable along with the estimated residual vector from the proposed first-stage instrumental variables regression into the transition probit. A significant coefficient on the residual indicates that endogeneity is a serious problem.

[47] Results from first-stage instrumenting equations are provided in Appendix Table 2. Note that our instrumental variables are statistically significant in all first-stage regressions.

probability of entry. Further, the entrepreneurship tax rate effect is more than double the size of the wage tax rate effect in absolute value, suggesting that equal or across-the-board cuts in both tax rates would increase the overall probability of entrepreneurial entry.

For single filers, the estimated tax rate coefficients indicate that cutting the wage MTR by one percentage point, holding the entrepreneurship MTR and everything else in the model constant, would decrease the probability of entrepreneurial entry by 0.58 percentage points. Similarly, cutting the entrepreneurship MTR by one percentage point would increase the probability of entrepreneurial entry by 1.42 percentage points. The corresponding magnitudes for married filers are 0.51 and 2.00, respectively.

These results are particularly enlightening given the fact that relative tax rates changed during the 1980s as discussed above. Given that marginal tax rates are generally blind to the source of income under current law, however, it is perhaps more relevant to consider the effects of across-the-board tax cuts of equal amounts. According to our empirical results, cutting both the wage MTR and entrepreneurship MTR simultaneously by one percentage point would have the combined effect of increasing the probability of entrepreneurial entry, but specific magnitudes are difficult to assess in a general equilibrium framework. Also, to assess the overall effect of taxes on entrepreneurial activity, one must consider exit decisions. Gurley-Calvez and Bruce (2008) find that an across-the-board tax cut reduces the probability of exit. Combining this result with ours, such a tax cut would yield an overall increase in entrepreneurial activity from greater entry and fewer exits.

The remaining control variables are also largely statistically significant. Married filers with an age 65 exemption are less likely to enter entrepreneurship, despite the finding in earlier research that entrepreneurial activity is not uncommon among those in or near retirement (Bruce,

Holtz-Eakin, and Quinn 2000). Region of residence also has an important effect, although results are not consistent across filing status. Missing region has a large and positive effect for married filers, likely because those with missing state identifiers have AGI over $200,000.

The presence of a mortgage interest deduction is associated with a lower probability of entry, and the effect is larger for singles. Although we certainly do not have conclusive evidence, this finding may reveal that those with mortgage debt have reduced ability to borrow the necessary funds for a new entrepreneurial venture as they have already tapped their available credit. Additional children away from home increase entry probabilities for both filing status groups. Finally, and perhaps most interestingly, those with a larger balance due on their tax returns are more likely to enter. While the magnitudes of these effects are indeed quite small, it suggests that our balance due indicator might be serving well as a proxy for risk-taking behavior.

Robustness Checks: We estimate a series of robustness checks to address a variety of issues. First, we address a frequent criticism in the related literature that the chosen measure of entrepreneurship—typically self-employment—is either not broad enough or not narrow enough. In Table 4, we present alternative models of entrepreneurial entry that are identical to the baseline model in Table 3 but use more inclusive measures of entrepreneurship. The top half of Table 4 explores entry into Measure 2 (which includes filers with a Schedule C plus those with partnership or small business corporation income), while the bottom half of the Table examines Measure 3 (which adds those with rental or royalty income to Measure 2).

As in the baseline analysis, our tests indicate that endogeneity is a problem, so we focus our discussion on the IV results. Interestingly, the results from this exercise are very similar to those in the baseline model, suggesting that our general conclusions are robust to alternative measures of entrepreneurship. This echoes the general theme from Bruce and Holtz-Eakin

(2001). Results for other variables are also similar to the baseline results in Table 3.

Table 5 presents partial results from a series of additional robustness checks, with baseline results provided for purposes of comparison. All of these checks included the full list of control variables in the baseline model, but only the IV tax rate coefficients and standard errors are shown for convenience and brevity. Results remain remarkably consistent when the entrepreneurial sector MTR is calculated with respect to other income, when the sample is restricted to filers whose filing status (single or married) does not change during the panel period, and when the sample is restricted to those filers who were present in the panel for all twelve years.[48]

The next robustness check in Table 5 is intended to foster more direct comparison with Bruce (2000), the most similar of the previous studies in this area. Rather than enter the tax rates separately as in our baseline model, this check enters the tax rates as a single "tax rate differential" variable defined as the wage MTR minus the entrepreneurship MTR. Bruce (2000) estimated a positive coefficient on this tax rate differential in a model without endogeneity controls, but the sign changed to negative when an instrumental variables approach was taken. We do not observe this sign change, as the instrumental variables approach yields a positive coefficient for both single and married filers. Nonetheless, this positive sign is consistent with the baseline findings using separate tax rates.[49]

An additional robustness check considers average tax rates (ATRs) rather than marginal tax rates (MTRs). The ATR is defined here as the ratio of the filer's tax liability to his or her

[48] This robustness check partially addresses concerns of household attrition in the panel of data as the previously presented models do not account for changes in the filing population. In a further robustness check, the sample was divided into 1979-1985 and 1987-1990 to see whether results differed before and after the relatively dramatic tax reforms of 1986. Significance patterns for single and married filers in each time period were identical to the twelve-year specification and estimated coefficients were nearly the same.

[49] Note that this positive sign implies that increases in the wage MTR will increase the probability of entry, while increases in the entrepreneurship MTR will reduce the probability of entry, all else equal.

adjusted gross income. While MTRs measure the tax on the next dollar of income earned, ATRs more accurately portray the overall tax burden as a share of the filer's income. The MTR captures effects of taxes on entrepreneurship decisions at the margin, while the ATR captures the effects of taxes on entrepreneurship in an "all or nothing" sense.[50] This part of our analysis is partially motivated by the work of Robson and Wren (1999), who found opposing effects of marginal and average tax rates on self-employment. Indeed, our ATR results are broadly consistent with Robson and Wren (1999) in that we find that higher entrepreneurship ATRs are associated with higher probabilities of entry. This result holds when we focus only on households that make a full transition to entrepreneurship (i.e. have no wage and salary income at time $t + 1$). However, coefficient magnitudes are perhaps implausibly large and wage ATR results vary by marital status, perhaps because there is not as much variation in household level ATRs across employment sectors. Further exploration with average tax rates could be a fruitful area for future research.

Finally, we address an issue commonly raised in studies of entrepreneurial activity, namely, do "full-time" entrepreneurs respond differently to tax incentives? We estimate the same specification outlined above but only include entrepreneurs who made a complete transition into entrepreneurship (that is, households that were not entrepreneurial at time *t,* entered entrepreneurship at time $t + 1$ *and* had no wage-and-salary income at time $t + 1$).[51] These results, presented at the bottom of Table 5, are consistent with our baseline analysis.[52] An

[50] In is not obvious which, if either, of the two tax rates (MTR or ATR) is most relevant in the entry decision. Their relative importance is surely individual-specific, as some potential entrants add the new entrepreneurial activity at the margin while others switch entirely from wage employment into entrepreneurial activity. We have focused on the MTR in our baseline analysis primarily because MTRs have been the focus in much of the prior literature.

[51] To be sure, this is an imperfect way to test for differences in transition margins. For instance, married households with no wage-and-salary income likely reflect households where one spouse participates in an entrepreneurial activity and one spouse is not in the labor market.

[52] We also experimented with including a full-time dummy variable and interaction terms (full-time dummy * Wage

increase in the tax rate on wage-and-salary income increases the probability of entry while an increase in the tax rate on entrepreneurial income reduces the probability of entry. In terms of magnitude, the effects from the wage-and-salary tax rate are roughly on par with those of the baseline specification. However, "full-time" entrepreneurs are substantially more responsive to changes in the entrepreneurial tax rate as the coefficient on the entrepreneurial MTR is about double in magnitude compared to the baseline results.

Conclusions and Suggestions for Future Research

We find convincing evidence that marginal tax rates have important effects on entrepreneurial entry decisions. Cuts in wage-sector MTRs reduce the probability of entry, while cuts in entrepreneurship MTRs increase the probability of entry. These central conclusions are robust to a number of alternative specifications. Our results suggest that the leveling of the payroll tax playing field that took place during the 1980s, where tax rates on entrepreneurs were increased relative to those on wage-and-salary workers, might have resulted in lower rates of entrepreneurial entry than might have otherwise been observed. On the other hand, the simultaneous across-the-board marginal income tax rate cuts might have resulted in more entry.

Interestingly, our results do not align with those from Bruce (2000), who found that an increase in the tax rate on entrepreneurial income increases the probability of entry. A number of important differences in data and estimation methods may possibly account for this. First, Bruce (2000) limited the analysis to male heads of household between the ages of 25 and 54 while the current study includes all tax filers regardless of age or gender. Second, our analysis allows for the possibility that entrepreneurial households also have wage-and-salary income,

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MTR and full-time dummy * Entrepreneurship MTR). Results from this specification are qualitatively similar and available from the authors upon request.

while Bruce (2000) ignored non-self-employment income in the calculation of self-employment tax rates. Third, the available set of control variables was much richer for Bruce (2002) than for the current study, which is necessarily limited on that dimension by our use of tax return data.[53]

Perhaps most importantly, while Bruce (2000) examined survey data on self-reported self-employment status from the Panel Study of Income Dynamics, we consider reported small business income from federal income tax returns. One important facet of this difference concerns the nature of entrepreneurial activity. Self-reported self-employment status is potentially a significantly different indicator of small business activity than small business income on a tax return. This point actually raises the possibility that the two sets of results might be broadly consistent, to the extent that tax rate increases make more people say they are self-employed while also resulting in fewer tax filers actually reporting small business income. As with Bruce (2000), this could be an indication of a tax evasion effect driving both sets of results.

Future analysis should consider the effects of other taxes, namely estate taxes, taxes on corporate income, and the array of taxes at the state and local levels. Equally useful would be careful analysis of non-rate tax policies such as depreciation allowances and provisions regarding the deductibility of health insurance. Finally, our results reveal the continuing possibility that entrepreneurs respond differently to average tax rates than marginal tax rates.

[53] Unfortunately, the combination of these important differences makes it virtually impossible to recreate Bruce's (2002) estimation approach within our current tax return data framework.

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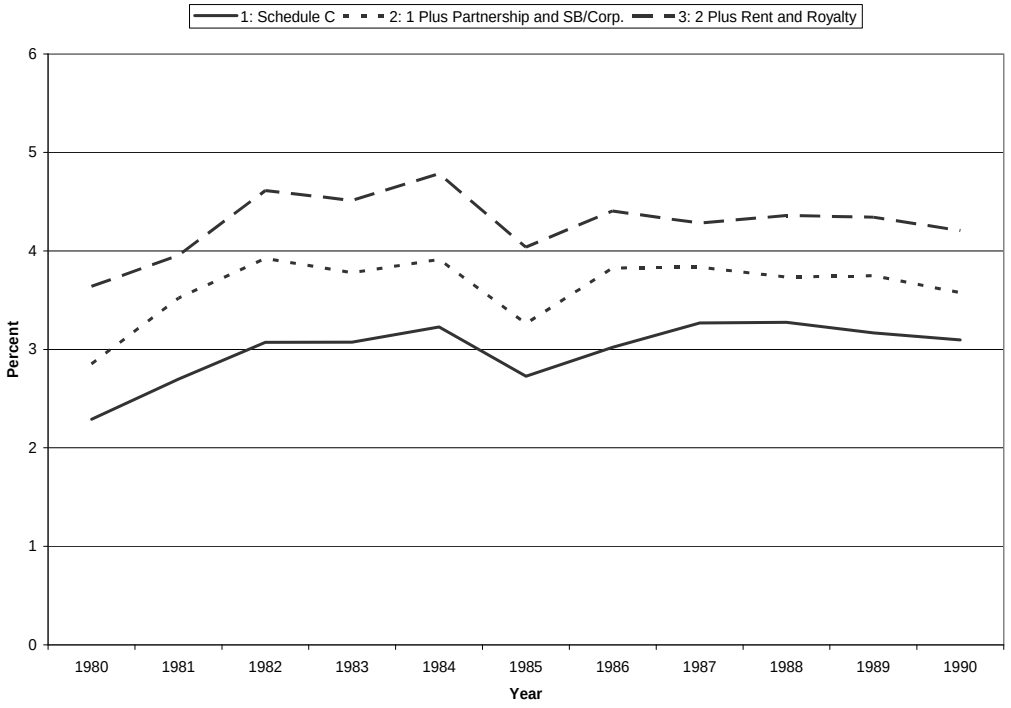

Figure 1: Entrepreneurial Entry Rates

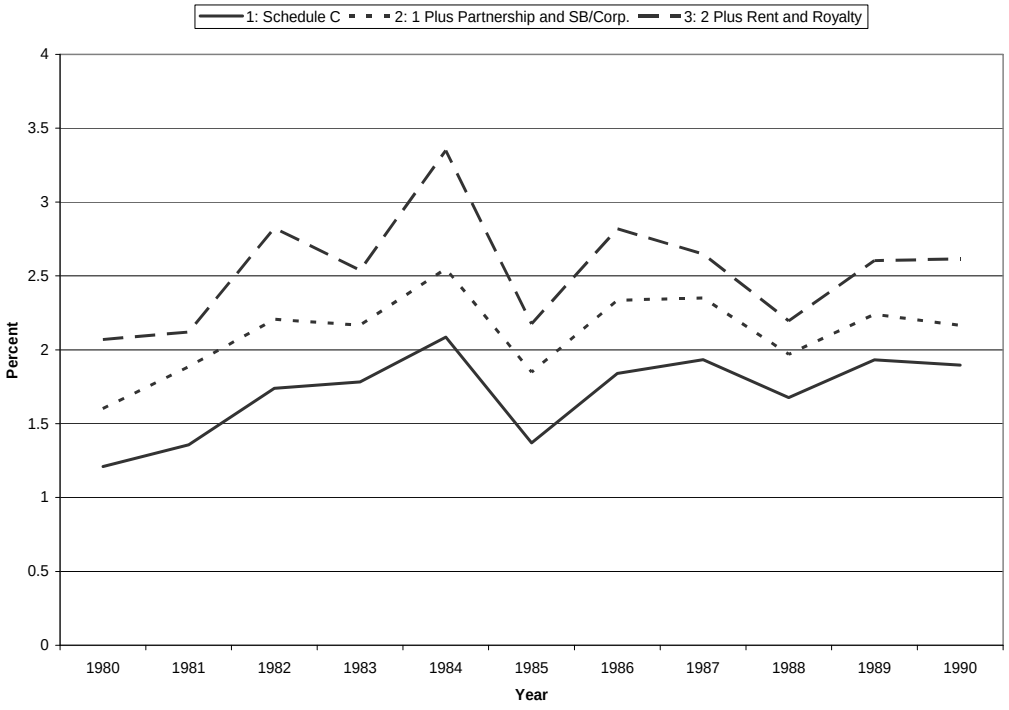

Figure 2: Entrepreneurial Entry Rates for Single Filers

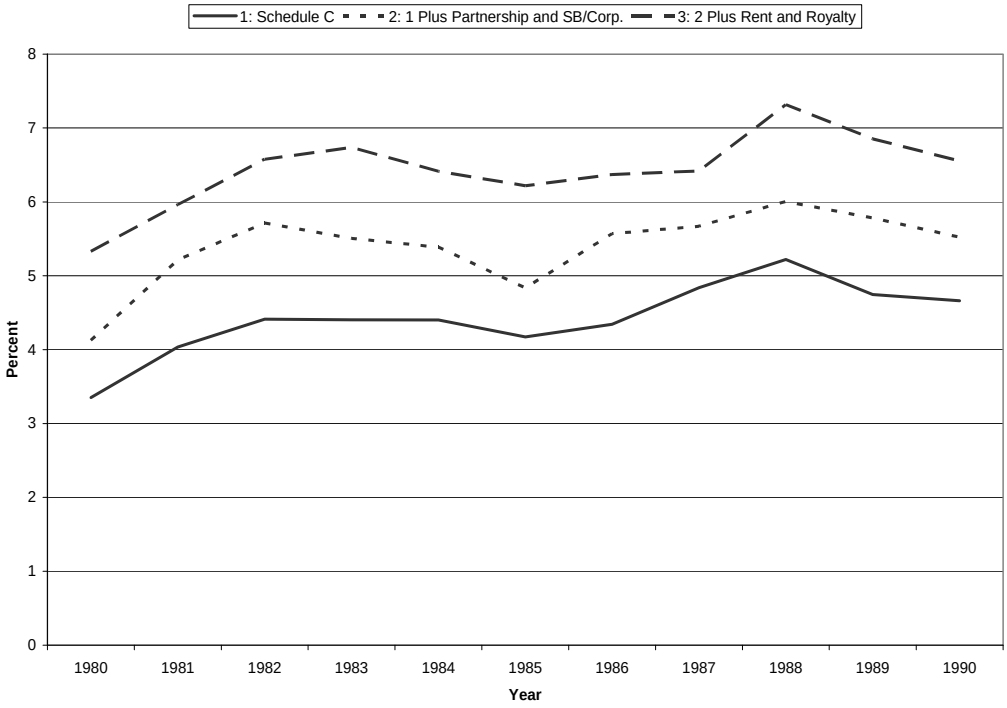

Figure 3: Entrepreneurial Entry Rates for Married Filers

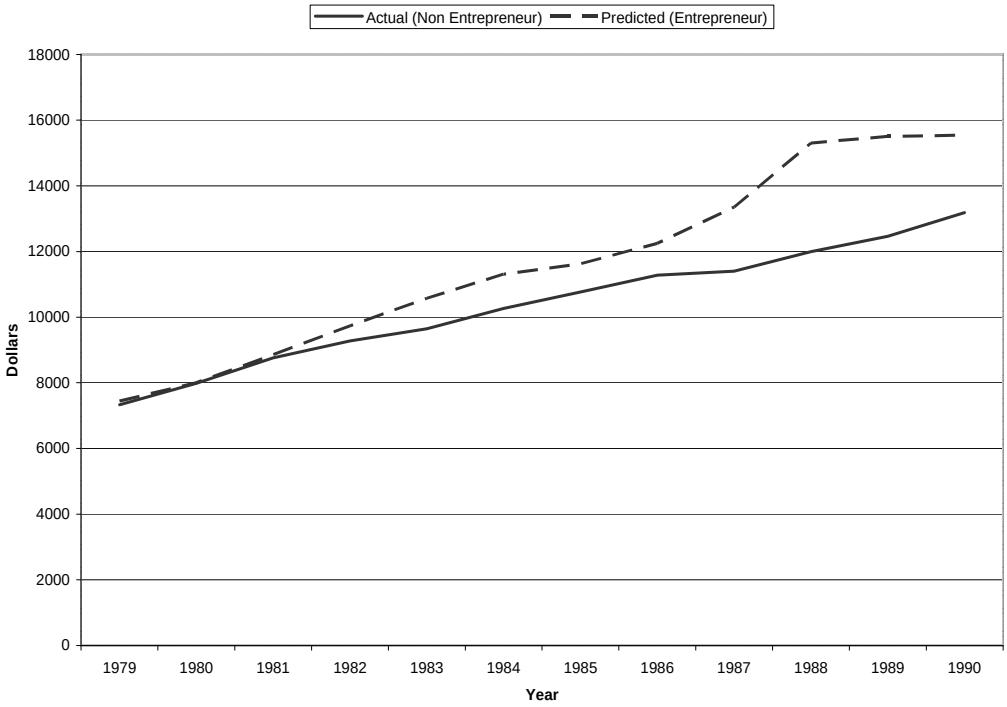

Figure 4: Observed Wage Income and Predictions for Single Filers

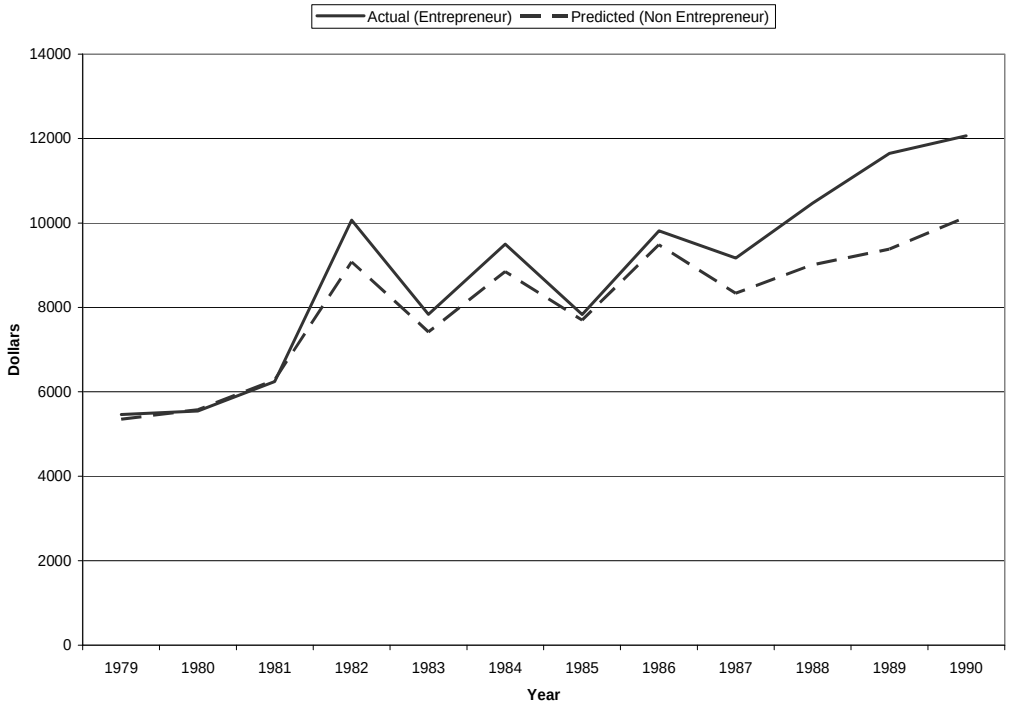

Figure 5: Observed Entrepreneurial Wage Income and Predictions for Single Filers

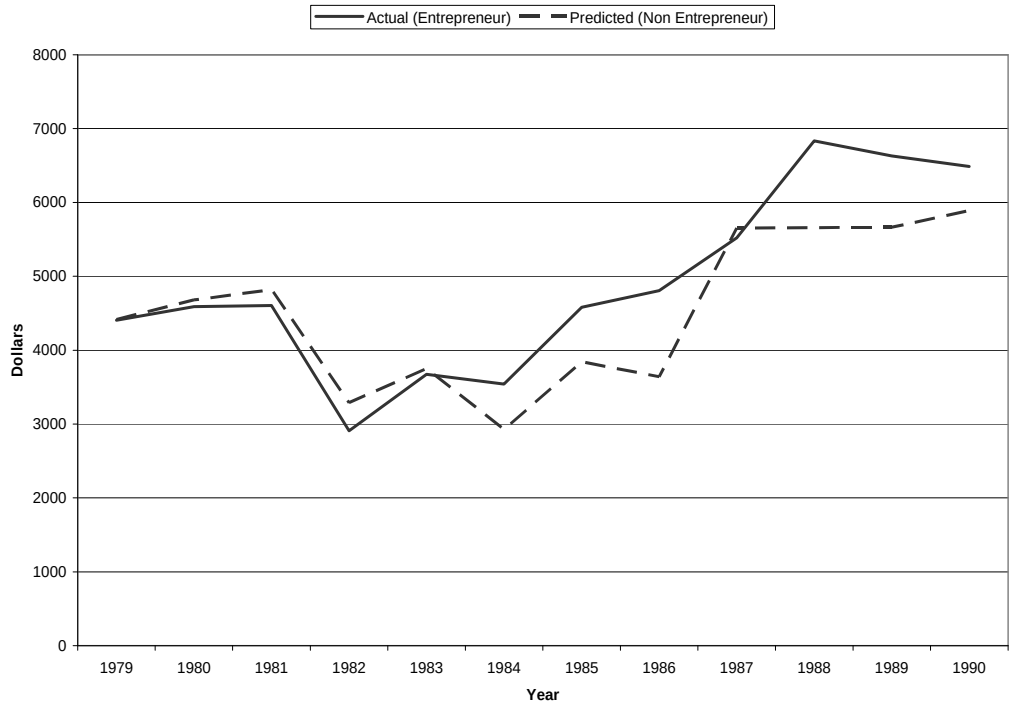

Figure 6: Observed Entrepreneurial Income and Predictions for Single Filers

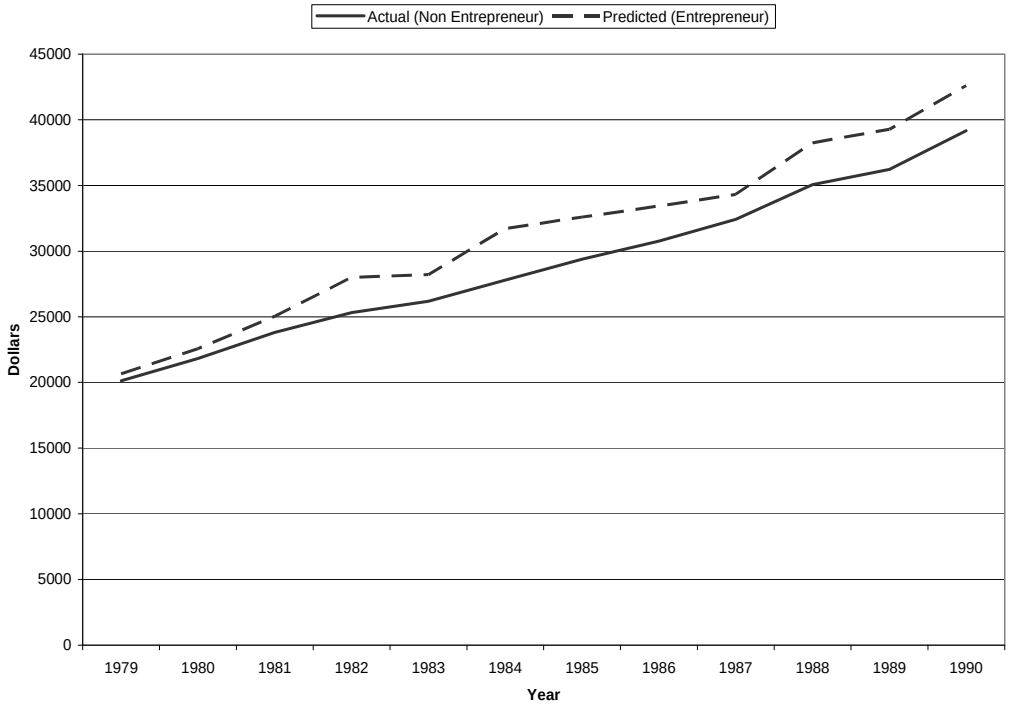

Figure 7: Observed Wage Income and Predictions for Married Filers

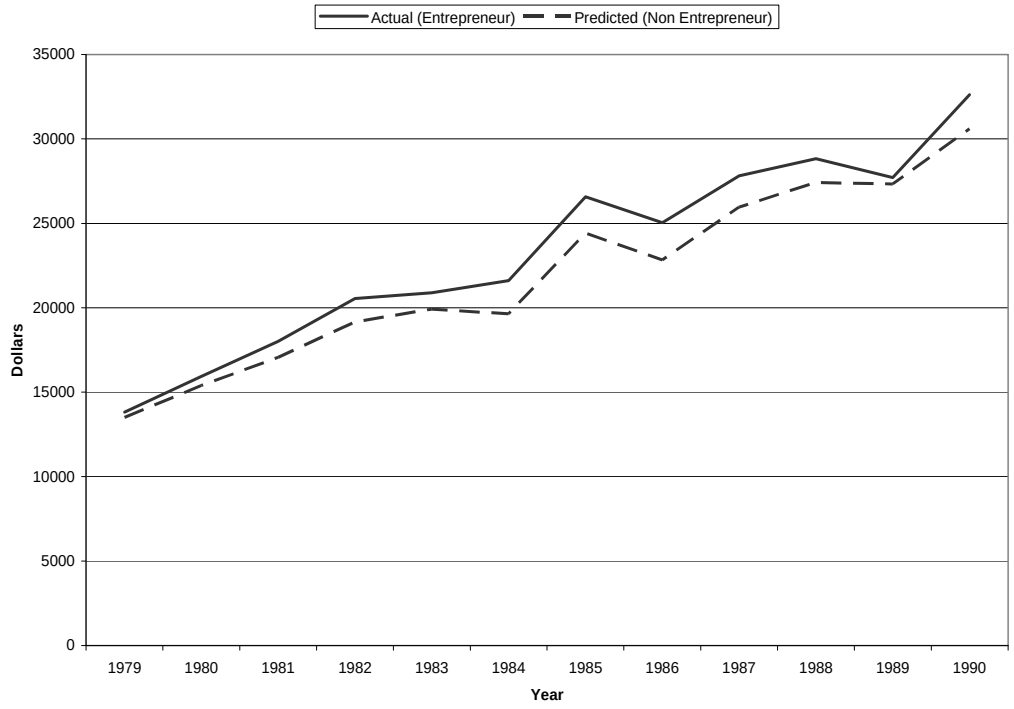

Figure 8: Observed Entrepreneurial Wage Income and Predictions for Married Filers

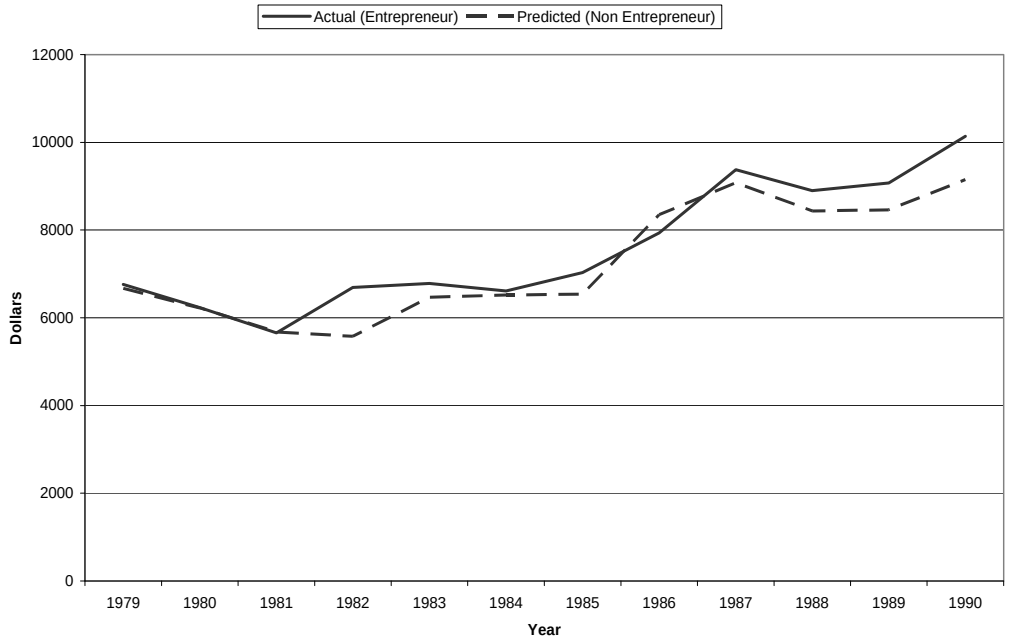

Figure 9: Observed Entrepreneurial Income and Predictions for Married Filers

Table 1: Tax Rates by Filing Status and Entrepreneurship Status

		Marginal Tax Rates		Average Tax Rates	
ENTRY		**Did Not Enter**	**Entered**	**Did Not Enter**	**Entered**
Single	**Wage TR**	30.62	33.19	19.06	21.37
	Entrepreneurship TR	32.52	26.72	21.74	18.48
Married	**Wage TR**	36.92	37.82	16.27	18.13
	Entrepreneurship TR	34.99	33.05	17.57	17.65

Note: Entries are post-transition means, and all tax rates are inclusive of federal income and payroll and state income taxes. Entrepreneurship status in this table is defined by the presence of a Schedule C.
TR = Tax Rate. See text for additional details.

Table 2: Summary Statistics for Key Analysis Variables

	Single		Married	
	Mean	**S.D.**	**Mean**	**S.D.**
Entry 1	0.016	0.125	0.042	0.201
Entry 2	0.020	0.140	0.052	0.222
Entry 3	0.024	0.153	0.062	0.241
Age 65	0.097	0.295	0.121	0.326
West	0.201	0.401	0.187	0.390
Midwest	0.248	0.432	0.260	0.438
Northeast	0.234	0.423	0.205	0.404
Other Region	0.005	0.072	0.007	0.081
Missing Region	0.001	0.028	0.005	0.073
Mortgage Interest Ded.	0.094	0.292	0.398	0.490
Kids Home	0.286	0.746	1.125	1.280
Kids Away	0.018	0.182	0.023	0.209
Total Exemptions	1.407	0.931	3.312	1.352
Balance Due ($100)	-0.313	2.242	-0.349	9.579

Note: Means and standard deviations (S.D.) for all variables except entry measures are based on estimation samples used for the Measure 1 (Schedule C) models only. See text for additional details.

Table 3: Baseline Entrepreneurial Entry Analysis

	Single				Married			
	Non-IV		IV		Non-IV		IV	
	Coeff.	**S.E.**	**Coeff.**	**S.E.**	**Coeff.**	**S.E.**	**Coeff.**	**S.E.**
Wage MTR	**0.009**	0.001	**0.203**	0.048	0.002	0.001	**0.123**	0.019
Entrepreneurship MTR	**-0.044**	0.001	**-0.496**	0.098	**-0.015**	0.001	**-0.477**	0.048
Age 65	**-0.567**	0.063	-0.376	0.283	**-0.333**	0.059	**-1.736**	0.279
West	0.037	0.030	**-0.637**	0.180	**0.102**	0.028	**0.563**	0.084
Midwest	-0.028	0.030	-0.026	0.100	-0.010	0.027	**0.628**	0.111
Northeast	0.001	0.031	**0.496**	0.202	**-0.155**	0.031	**0.927**	0.152
Other Region	**-0.904**	0.256	-2.597	4.860	**-1.227**	0.281	-2.504	5.846
Missing Region	-0.049	0.353	1.810	5.760	0.077	0.119	**1.448**	0.303
Mortgage Interest Ded.	**0.069**	0.032	**-1.485**	0.336	**0.199**	0.021	**-0.575**	0.087
Kids Home	**-0.091**	0.033	0.197	0.117	**0.113**	0.027	-0.057	0.046
Kids Away	0.018	0.059	**0.384**	0.129	**0.140**	0.049	**0.280**	0.088
Total Exemptions	**0.057**	0.027	0.038	0.096	**-0.093**	0.024	**0.104**	0.045
Balance Due ($100)	**0.006**	0.003	**0.032**	0.015	0.001	0.001	**0.007**	0.003
Sample Size	91,461		91,461		83,909		83,894	

Notes: Entries are coefficients and standard errors (S.E.) from random effects probits. All models also include a constant and a series of indicators for the year of the observation. Entrepreneurship in this table is defined by the presence of a Schedule C (Measure 1). Standard errors for IV models are bootstrapped using 50 iterations of the model. MTR = Marginal Tax Rate.
Bold type indicates statistical significance at the five percent level or better.

Table 4: Entrepreneurial Entry Analysis - Alternative Entrepreneurship Measures

Measure 2	Single				Married			
	Non-IV		IV		Non-IV		IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wage MTR	**0.009**	0.001	**0.290**	0.057	0.000	0.001	**0.212**	0.028
Entrepreneurship MTR	**-0.047**	0.001	**-0.469**	0.075	**-0.034**	0.001	**-0.543**	0.057
Age 65	**-0.283**	0.051	**0.479**	0.196	**-0.330**	0.055	**-1.186**	0.286
West	**0.104**	0.028	**-0.285**	0.109	**0.183**	0.028	**0.683**	0.099
Midwest	**-0.064**	0.028	**-0.446**	0.136	**0.083**	0.026	**0.591**	0.124
Northeast	**0.067**	0.029	**0.463**	0.161	0.058	0.030	**1.593**	0.225
Other Region	**-0.830**	0.229	-2.699	3.832	**-0.841**	0.192	-1.191	0.623
Missing Region	-0.118	0.469	2.280	1.805	**0.966**	0.144	**1.704**	0.310
Mortgage Interest Ded.	**0.270**	0.029	**-1.019**	0.272	**0.251**	0.021	**-0.735**	0.102
Kids Home	**-0.114**	0.032	0.169	0.114	**0.085**	0.026	0.005	0.050
Kids Away	0.093	0.054	**0.428**	0.148	**0.172**	0.046	**0.437**	0.089
Total Exemptions	**0.053**	0.026	-0.053	0.087	**-0.065**	0.023	0.048	0.047
Balance Due ($100)	**0.045**	0.006	**0.058**	0.022	0.003	0.001	0.008	0.005
Sample Size	89,490		89,490		78,726		78,726	

Measure 3	Single				Married			
	Non-IV		IV		Non-IV		IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wage MTR	**0.017**	0.001	**0.278**	0.062	0.002	0.001	**0.184**	0.030
Entrepreneurship MTR	**-0.090**	0.002	**-0.366**	0.034	**-0.067**	0.001	**-0.267**	0.027
Age 65	**-0.436**	0.064	-0.055	0.203	**-0.504**	0.056	-0.010	0.200
West	**0.124**	0.037	-0.083	0.116	**0.205**	0.029	**0.215**	0.068
Midwest	-0.066	0.036	**-0.378**	0.133	**0.114**	0.027	-0.038	0.078
Northeast	0.026	0.038	-0.062	0.121	**0.076**	0.030	0.154	0.101
Other Region	**-1.259**	0.273	**-1.555**	0.605	**-0.692**	0.194	0.154	0.341
Missing Region	-1.044	0.726	2.017	5.366	**0.908**	0.192	**1.807**	0.565
Mortgage Interest Ded.	**0.334**	0.039	**-0.987**	0.218	**0.205**	0.022	**-0.532**	0.116
Kids Home	**-0.141**	0.042	**0.286**	0.132	**0.102**	0.026	**0.204**	0.047
Kids Away	0.073	0.073	0.278	0.171	**0.255**	0.048	**0.424**	0.110
Total Exemptions	0.025	0.033	**-0.291**	0.109	**-0.090**	0.024	**-0.188**	0.042
Balance Due ($100)	**0.063**	0.007	**0.049**	0.023	**0.006**	0.002	0.001	0.010
Sample Size	85,842		85,842		71,271		71,271	

Notes: Entries are coefficients and standard errors (S.E.) from random effects probits. All models also include a constant and a series of indicators for the year of the observation. MTR = Marginal Tax Rate.
Entrepreneurship Measure 2 includes filers with income from a Schedule C, Partnership, or Small Business Corporation.
Entrepreneurship Measure 3 includes filers in Measure 2 plus those with rental or royalty income.
Standard errors for IV models are bootstrapped using 50 iterations of the model.
Bold type indicates statistical significance at the five percent level or better.

Table 5: Entrepreneurial Entry Analysis - Robustness Checks

		Single		Married	
		Coeff.	**S.E.**	**Coeff.**	**S.E.**
Baseline (for comparison)	**Wage MTR**	**0.203**	0.016	**0.123**	0.009
	Entrepreneurship MTR	**-0.496**	0.029	**-0.477**	0.017
MTR based on "other income"	**Wage MTR**	**0.203**	0.016	**0.123**	0.009
	Entrepreneurship MTR	**-0.401**	0.023	**-0.427**	0.015
Include only those whose filing status does not change	**Wage MTR**	**0.270**	0.023	**0.122**	0.009
	Entrepreneurship MTR	**-0.589**	0.038	**-0.472**	0.017
Include only those who are in the panel for the full twelve years	**Wage MTR**	**0.166**	0.029	**0.131**	0.015
	Entrepreneurship MTR	**-0.537**	0.095	**-0.511**	0.028
MTR Differential	**Wage MTR - Entrep. MTR**	**0.156**	0.008	**0.178**	0.097
Average Tax Rate	**Wage ATR**	**0.067**	0.007	**-0.920**	0.175
	Entrepreneurship ATR	**3.034**	0.117	**1.303**	0.119
Transitions to "full-time" entrepreneurship	**Wage MTR**	**0.256**	0.032	**0.199**	0.028
	Entrepreneurship MTR	**-0.863**	0.063	**-0.801**	0.060

Notes: Entries are coefficients and standard errors (S.E.) from random effects probits. All models also include a constant, a series of indicators for the year of the observation, and all control variables in Table 3. All tax rates and differentials are fitted values from first-stage instrumental variables regressions. MTR = Marginal Tax Rate. ATR = Average Tax Rate. All models use entry Measure 1 (Schedule C). See text for additional details.
Bold type indicates statistical significance at the five percent level or better.

Appendix

Appendix Table 1: Variable Definitions and Notes

Variables Used in Econometric Models	
Age 65	=1 if there is at least one age 65 exemption in a household.
West	=1 if residence in the following states: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.
Midwest	=1 if residence in the following states: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
South	=1 if residence in the following states: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia. (This is the omitted reference category.)
Northeast	=1 if residence in the following states: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.
Other Region	=1 for residence classification other than the above, excluding missing residence.
Missing Region	=1 if the state identifier is missing (adjusted gross incomes of $200,000 or more).
Mortgage Interest Ded.	=1 if the household claimed a mortgage interest deduction.
Kids Home	Number of exemptions claimed for children living at home.
Kids Away	Number of exemptions claimed for children living away from home.
Total Exemptions	Total number of exemptions claimed.
Balance Due ($100)	Amount due on the tax return (negative if receiving a refund) divided by 100.
Variables Used to Estimate Tax Rates in TAXSIM	
Tax Year	1979-1990. (Late or amended returns are reassigned to the appropriate tax year.)
State	Indicator for 50 states and DC; other residences treated as missing.
Marital Status	Married (includes widow(er)s and married filing separately), single, or head of household.
Dependent Exemptions	Number of dependent exemptions claimed.
Age Exemptions	Number of age and exemptions other than dependents. (Note: Other exemptions were included in this category as there was not a separate place to enter them and placing them in the dependent exemptions category could potentially distort Earned Income Tax Credit eligibility. However, as TAXSIM only allows a maximum value of "2" in this field, all values greater than "2" were set to the maximum.)
Wage-and-salary Income of the Taxpayer	Wage-and-salary income for the household. Self-employment earnings are included in the category as long as the sum of wage earnings and self-employment earnings is not less than zero. When this sum is negative, wage-and-salary income is set to zero and the remaining negative amount is added to (subtracted from) other income (see below).
Wage-and-salary Income of the Spouse	Set to zero for all households (spousal income cannot be distinguished for joint filers).
Dividend Income	Gross dividend income (the gross amount of dividend income is used for 1979-1986 after which there is not a distinction between taxable and total dividend income).
Other Property Income	All income other than wages, self-employment income, dividends, pensions, social security benefits, and unemployment compensation. Can be negative. Self-employment income is included only to the extent that losses are not offset by wage earnings (see "Wage-and-salary Income of the Taxpayer" for more details).
Taxable Pensions	Taxable portion of reported pension income (addition of amounts reported on Form 1040 and Schedule E for years 1979-1986).
Gross Social Security Income	Gross income from social security benefits.
Other Non-taxable Transfer Income	Not reported in the tax return data; set to zero for all observations.
Rent Paid	Not reported in the tax return data; set to zero for all observations.
Property Taxes Paid	Amount paid in property taxes reported as an itemized deduction on Schedule A.
Itemized Deductions	Deductions other that state income tax and property taxes.
Child Care Expenses	Gross amount of child care expenses or the maximum reportable amount, whichever is greater. For 1979-1980 only the credit amount, not gross expenses, was reported. Gross expenditures were estimated by taking the credit amount times 5. When this estimate exceeded the maximum claimable amount, it was set to the maximum.
Unemployment Compensation	Gross unemployment compensation (the gross amount of unemployment compensation is used for 1979-1986 after which there is not a distinction between taxable and total unemployment compensation).

Appendix Table 2: First-Stage Instrumental Variables Regression Results

MTR Regressions	Single				Married			
	Wage		Entrepreneurship		Wage		Entrepreneurship	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Instrument	**0.005**	0.000	**0.002**	0.000	**0.006**	0.000	**0.005**	0.000
Age 65	**-2.472**	0.224	**-1.700**	0.110	**-5.658**	0.177	**-4.864**	0.147
West	**1.537**	0.159	**-0.810**	0.076	**1.082**	0.148	**1.278**	0.109
Midwest	**1.140**	0.150	**0.510**	0.072	**2.223**	0.136	**1.942**	0.100
Northeast	**2.043**	0.155	**1.958**	0.074	**2.311**	0.147	**2.952**	0.109
Other Region	**1.478**	0.502	**-3.081**	0.300	**-1.590**	0.455	**-2.556**	0.392
Missing Region	**-3.610**	1.152	**1.821**	0.686	**-2.816**	0.404	**2.030**	0.358
Mortgage Interest Ded.	**3.058**	0.142	**-2.163**	0.080	**2.599**	0.078	**-0.912**	0.065
Kids Home	**-2.281**	0.124	**-0.375**	0.070	**-1.026**	0.085	**-0.548**	0.073
Kids Away	-0.366	0.227	**0.601**	0.130	-0.330	0.170	**0.381**	0.147
Total Exemptions	**1.958**	0.101	**0.810**	0.057	**0.812**	0.076	**0.562**	0.065
Balance Due ($100)	0.005	0.011	**0.057**	0.007	**0.009**	0.003	**0.017**	0.003
Sample Size	96,571		96,570		100,999		101,097	

ATR Regressions	Single				Married			
	Wage		Entrepreneurship		Wage		Entrepreneurship	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Instrument	**1.017**	0.018	**-0.316**	0.031	**-0.050**	0.021	**-0.202**	0.012
Age 65	**-12.094**	0.161	**-9.105**	0.095	**-8.244**	0.139	**-6.488**	0.119
West	**0.645**	0.122	**-0.749**	0.062	-0.120	0.111	-0.083	0.079
Midwest	**0.402**	0.115	**0.378**	0.059	**1.276**	0.102	**1.002**	0.073
Northeast	**1.583**	0.118	**2.232**	0.060	**1.861**	0.110	**1.901**	0.078
Other Region	**1.697**	0.400	**-1.151**	0.281	0.632	0.374	**-1.478**	0.317
Missing Region	1.737	0.911	**5.258**	0.638	**3.616**	0.334	**7.023**	0.297
Mortgage Interest Ded.	**2.085**	0.112	**-2.582**	0.070	**2.533**	0.062	**-1.058**	0.051
Kids Home	**-2.372**	0.097	**-1.463**	0.064	**-0.255**	0.069	**-0.376**	0.060
Kids Away	**-0.412**	0.179	**0.871**	0.120	0.196	0.139	**0.528**	0.121
Total Exemptions	**0.954**	0.079	**0.501**	0.053	-0.117	0.062	**0.139**	0.054
Balance Due ($100)	**-0.049**	0.009	0.002	0.007	**0.009**	0.002	**0.008**	0.002
Sample Size	96,486		96,570		101,068		101,101	

Note: Entries are coefficients and standard errors from random effects regressions. All models also include a constant and a series of indicators for the year of the observation. These results are based on Measure 1 (Schedule C).
MTR = Marginal Tax Rate; ATR = Average Tax Rate.
Bold type indicates statistical significance at the five percent level or better.