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**Tax Policies and Entrepreneurship:
Relative Tax Rates and Health Insurance Deductibility**

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Tami Jean Gurley
August 2005

Acknowledgements

A trusted advisor once told me that my dissertation would not be my life's work but merely its beginning. Many people have provided support, encouragement, and advice in the completion of this project and the beginning of my professional career. I would like to take this opportunity to thank them. First, I thank my advisor Don Bruce for his friendship and his valued input at every stage of the dissertation. His tremendous influence is not only reflected in this document but will be apparent in my future work. I thank the remainder of my committee, Bill Fox, Chip Herzog, Matt Murray, and Daniel Murphy for insightful comments and questions. In addition, I have received excellent encouragement and assistance from the faculty and staff of the economics department.

Jennifer Blakley has remained a true friend and tireless supporter throughout graduate school and I only hope that I can be half as helpful to her in her graduate studies. I thank Stacia Couch for answering all of my formatting questions (more than once) and the staff of the Center for Business and Economic Research (CBER) for their support. For his friendship and especially his willingness to share in the experiences of this past year, I thank John Deskins. Thanks to Laura for being a wonderful officemate this past year and to Laura, John, Karie, and Brian for their friendship and lively conversations.

Finally, I would like to thank the family and friends who made this work more enjoyable. My parents, Don and Becky Gurley, have always believed in the importance and possibilities of education. Thanks to my sister, Traci Gurley, for understanding my frustrations and for her unconditional support.

Abstract

I use a twelve-year panel of tax return data to assess whether or not taxes affect entrepreneurship. Beyond assessing possible distortions in entrepreneurial activities created by the tax system, this research provides information to policymakers on the effectiveness of tax policy in influencing entrepreneurial activity. The extent of entrepreneurial activity in the economy is a vital policy concern as entrepreneurs are thought to contribute to economic growth by creating jobs and producing innovations.

Past theoretical and empirical studies examining the effects of taxes on entrepreneurship produced ambiguous results creating the need for further study. Toward this end, I investigate the effects of tax rates on entrepreneurial entry and survival as well as the effects of health insurance deductibility on exits from an entrepreneurial activity. My contributions to the current literature include developing a model combining the two past theoretical approaches, using a panel of tax return data, and examining an aspect of the tax system (health insurance deductibility) beyond the tax rates typically studied.

I find convincing evidence that marginal tax rates and health insurance deductibility have important effects on entrepreneurial decisions. Results show that increases in marginal tax rates on wage income increase the probability of entry, increase the duration of entrepreneurial activities, and decrease the probability of exit. Increases in marginal tax rates on entrepreneurship income decrease the probability of entry, shorten entrepreneurial spells, and increase the probability of exit. The effects from changes in the entrepreneurial marginal tax rate are larger than those from the marginal tax rate on wages suggesting that an across the board tax cut would increase

entrepreneurship by increasing entry, decreasing exit, and enhancing survival.

Additionally, the availability of a health insurance deduction from income tax calculations enhances entrepreneurial survival.

Taken together, the results indicate that tax policy is a potentially effective tool for influencing levels of entrepreneurship in the economy. More broadly, these results provide evidence that multiple aspects of the tax code, including but not limited to tax rates, are relevant for assessing behavioral responses.

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Part I
Introduction

Entrepreneurs are thought to drive economic growth by creating jobs and producing innovations. Given the importance of entrepreneurship, researchers have long been interested in the factors that affect decisions to participate in an entrepreneurial activity. Taxes are one potential decision factor. From a policy perspective it is important to understand whether the tax code creates economic distortions (causing resources to be devoted to less productive activities) and if these distortions exist, how the tax code can be used as a policy tool to alter levels of entrepreneurial activity in the economy.

Two strains of economic theory have produced ambiguous effects of taxes on entrepreneurship and the effects have not been resolved by a growing empirical literature.¹ I examine the effects of tax rates on entrepreneurial entry and survival as well as the effects of health insurance deductibility on exits from an entrepreneurial activity. My contributions to the current literature include developing a model combining the two past theoretical approaches, using a panel of tax return data, and examining an aspect of the tax system (health insurance deductibility) beyond the tax rates typically studied.

I find convincing evidence that marginal tax rates and health insurance deductibility have important effects on entrepreneurial decisions. Results show that increases in marginal tax rates on wage income increase the probability of entry, while increases in marginal tax rates on entrepreneurship income decrease the probability of entry. In a similar analysis of entrepreneurial exit, I find that increases in

This research was supported by two grant from the U.S. Small Business Administration (Contract No. SBAHQ-03-M-0535 – Small Business Research Using Large Databases and Contract No. SBAHQ-04-M-0536 – Graduate Student Research), for which I am grateful. In addition, this research was funded in part by the Ewing Marion Kauffman Foundation. The contents of this dissertation are solely the responsibility of Tami Gurley.

¹ See Schuetze and Bruce (2004) and the references therein.

entrepreneurship tax rates increase the likelihood of exit, while increases in wage-sector tax rates reduce the probability of exit. The effects from changes in the entrepreneurial marginal tax rate are larger than those from the marginal tax rate on wages suggesting that an across the board tax cut would increase entrepreneurship. Specifically, an across the board cut in marginal tax rates would increase entry, decrease exit, and enhance survival. Additionally, the availability of a health insurance deduction from income tax calculations enhances entrepreneurial survival.

Taken together, the results indicate that tax policy is a potentially effective tool for influencing levels of entrepreneurship in the economy. More broadly, these results provide evidence that multiple aspects of the tax code, including but not limited to tax rates, are relevant for assessing behavioral responses.

Part II

The Effects of Tax Rates on Entrepreneurial Entry and Survival

A. Introduction

Entrepreneurs are thought to play a vital role in the economy, providing much of the energy behind job creation, technological advancement and overall economic growth. Researchers have long been interested in the process by which one becomes an entrepreneur. Many factors can affect decisions made within this process, including lifestyle, potential earnings and available resources. Relative tax burdens are another potential decision factor. My focus in this study is on the effects of federal and state income taxes and payroll taxes on transitions into or out of 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, I must resort to a measurable proxy for entrepreneurship. Most studies have examined individual responses on surveys to questions regarding self-employment activity. I take an innovative 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, the use of the terms “entrepreneur,” “entrepreneurship,” and “entrepreneurial activity” refer to this more limited but measurable concept rather than more general notions of entrepreneurship.

Relative tax treatments affect entrepreneurship decisions in various ways, two examples of which were noted by Goode (1949). First, many expenses related to the entrepreneurial venture are deductible in calculating taxable income. Further, 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 either deter entrepreneurial entry or expedite exit. Entrepreneurs might also be affected by other aspects of the tax system. For instance, the costs of complying with the tax code are likely to be relatively higher for entrepreneurs who run small businesses,² leading to lower levels of entrepreneurship.

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. Given the complexity of the tax code and the significant compliance burden on entrepreneurs and small businesses noted above, the necessity of self-reported entrepreneurial income can reduce the effective tax burden of entrepreneurs relative to wage and salary workers in three ways. First, entrepreneurs might not be aware of their actual tax burden and might mistakenly underreport their income or neglect to report certain information. 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. Finally, some entrepreneurs might attempt to engage in tax evasion by willfully misreporting income or expenses or simply failing to file a tax return.

Given the examples outlined above, it is clear that tax policies can potentially affect entrepreneurial decisions including entry and survival. This highlights a key

² 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).

motivation for studying the potential effects of tax policies on entrepreneurship, the familiar concept of economic distortion. Specifically, if the tax code results in either more or less entrepreneurial activity than would otherwise exist, it is said that the economy has been distorted away from its most efficient outcome. Such distortions reduce economic efficiency, as economic inputs (e.g., land, labor, capital, and entrepreneurship) are allocated toward less productive uses. Alternatively, if it can be shown that entrepreneurs are not sensitive to taxes in their decisions to start or maintain small businesses, then tax reform measures can be designed to achieve goals such as greater overall equity or simplicity without the fear of altering entrepreneurial decisions.

Economic theory suggests that taxes can have ambiguous effects on entrepreneurship (Bruce 2000 and 2002, Cullen and Gordon 2002). On one hand, a higher tax rate translates into lower net-of-tax returns from an entrepreneurial venture and thus reduces the likelihood that a potential entrepreneur will start a new business. On the other hand, higher tax rates reduce the inherent riskiness of a new enterprise by reducing the maximum net-of-tax losses and returns (Domar and Musgrave 1944). This implicit insurance aspect of the tax code can increase the likelihood of a small business start-up or prolong an existing entrepreneurial activity. The overall effect of taxes on entrepreneurship is, in the end, an empirical question.

Given this theoretical ambiguity, it is perhaps not surprising that the related empirical literature has not yielded a consensus regarding the effects of tax rates on entrepreneurship. Many studies have found that higher tax rates lead to higher rates of entrepreneurial activity, while a number of more recent studies have called this general finding into question. More research on this topic is needed, such that policy makers

might be better positioned to design and defend effective, efficient, and equitable tax rules.

Research on the effects of tax policy on entrepreneurial activity has flourished in recent years due in part to the availability of vast longitudinal databases containing multiple years of information for large samples of current and potential entrepreneurs. The ability to track individuals over time, especially when the time period includes a major federal tax reform, has resulted in dramatic increases in the quality of this body of research. It is the intent of this research to extend the growing literature by examining the effects of federal income and payroll taxes and state income taxes on entrepreneurial entry and survival.

My research makes use of a rich panel of individual tax return data to contribute toward this overarching mission. I begin by examining the effects of marginal and average tax rates on transitions into entrepreneurial activity. I then investigate the effects of taxes on entrepreneurial survival using state-of-the-art multivariate econometric techniques, described in detail below. I build upon earlier research by considering a number of indicators of entrepreneurial activity and controlling for the likely endogeneity of individual tax rates in entrepreneurial decisions.

Part I is organized as follows. Chapter 2 presents the motivation for my work, including a brief history of the relative tax treatment of entrepreneurs under the U.S. federal individual tax system. Prior studies of the taxation of entrepreneurs are reviewed in Chapter 3. I present a theoretical model to motivate the subsequent empirical analysis in Chapter 4. Chapter 5 contains a description the data. Chapters 6 and 7 present the empirical methods and results for the entry and survival analyses, respectively. Chapter 8

concludes Part I with a summary and suggestions for future research.

B. 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 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).

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 the early 1960s, the statutory payroll tax rate on self-employment income was one-and-a-half times the employee's rate on wage-and-salary income. From the early 1960s through 1984, however, self-employment income was subject to a tax that was less than one-and-a-half times the wage-and-salary rate.

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.³

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.⁴ 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.

³ 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.

⁴ 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.

Despite some small gains, it is apparent that 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 variation that can be used in analyzing individual sensitivity to tax policies among potential entrepreneurs.

C. Prior Studies of the Taxation of Entrepreneurs

Theoretical models have focused on two different dimensions of the tax system, namely the effects of tax policies on the relative risk of the entrepreneurial sector through loss offsets (Bruce 2000 and 2002, Cullen and Gordon 2002) and the opportunities for and benefits of evasion (Watson 1985, Kesselman 1989). Results of the theoretical literature are ambiguous, and have not been resolved by the inconsistent empirical findings.⁵

In models of relative risk, wage and salary employment provides a certain income whereas entrepreneurship involves an uncertain return. An increase in the relative tax rate faced by entrepreneurs has two potential effects. First, the higher relative rate reduces the returns to the entrepreneurial venture relative to wage and salary work, decreasing the likelihood of starting or remaining in an entrepreneurial activity. Conversely, if loss offsets are allowed, an increase in the relative tax rate compresses the entrepreneurship income distribution and reduces the risk of entrepreneurial ventures.

⁵ See Schuetze and Bruce (2004) for a more detailed summary of the literature on taxes and self-employment.

This implicit insurance leads to an expected increase in entrepreneurial entry and a reduction in entrepreneurial exits.

The absence of a third-party to report income or expenses on behalf of many entrepreneurs might increase the likelihood that entrepreneurs either unknowingly misreport their taxable income (due to tax complexity) or engage either in legal tax avoidance or illegal tax evasion. Theoretical models of behavior that account for evasion opportunities also yield ambiguous effects of taxation on the extent of evasion activities and depend crucially on risk attitudes.⁶ The scant empirical research on tax evasion among entrepreneurs has been somewhat inconclusive.⁷

Both of the theoretical approaches discussed above produce ambiguous results and the lack of consensus in the theory highlights the importance of empirical work on the topic. It is perhaps unsurprising that despite a growing empirical literature on the economic effects of taxes on entrepreneurship, little consensus has arisen. Most of the empirical studies were restricted by their use of cross-section or time series data rather than panel data, and most used aggregate tax information—such as statewide average tax rates—to avoid issues of tax rate endogeneity.⁸ A number of more recent studies have used panel data and have relied on exogenous changes in tax rules to deal with the potential endogeneity of individual tax rates.

Time series studies have focused on national-level tax policies, mainly in the U.S.

⁶ See Watson (1985) and Kesselman (1989).

⁷ For example, Joulfaian and Rider (1998) found a positive relationship between marginal tax rates and evasion among the self-employed. Slemrod, Blumenthal, and Christian (2001) showed evidence that suggested that Schedule C filers were more likely to engage in tax evasion, but the amount of tax revenue at stake was likely to be small.

⁸ An individual's marginal tax rate can be endogenous to the entrepreneurship decision if, for example, the tax rate is a function of whether or not one is self-employed.

and the U.K. Early studies, some of which have relied on time series econometric techniques that have since been found to be problematic, generally conclude that higher federal tax rates lead to higher rates of self-employment.⁹ The explanation for this result usually rests on the assumption that high tax rates drive workers out of paid employment, or wage jobs, into entrepreneurial ventures where they can more easily avoid or evade taxes. More recent time series studies used more sophisticated time series econometric tools, typically involving some consideration of cointegration (i.e., the case where two or more series exhibit a common trend but might not necessarily be closely linked).¹⁰

Somewhat surprisingly, the general positive relationship between tax rates and self-employment rates continued to hold even after addressing cointegration. Parker (1996) found that higher marginal tax rates increased self-employment rates, and Robson (1998) found a positive relationship between self-employment and the average tax rate. Robson and Wren (1998) provided a model that predicted (and regressions confirmed) that higher marginal tax rates reduced self-employment rates while higher average tax rates increased self-employment.¹¹ This divergence was attributed to the positive (negative) relationship between average (marginal) tax rates and optimal effort and evasion. Higher marginal tax rates reduce the return to effort, thereby leading to reduced self-employment even though the rate of evasion may increase.

⁹ 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).

¹⁰ In time series data on tax rates and self-employment rates, one often observes that both series have trended generally downward, especially in the U.S., in recent decades. Both rates were quite high in the mid-1900s but have gradually fallen over time. This relationship may or may not involve some form of causation, but only more modern econometric techniques can fully address this.

¹¹ Robson and Wren (1998) examined data for 15 OECD countries for the years 1978, 1981, 1985, 1989, and 1992.

While time series studies of self-employment have clearly dominated the empirical literature on taxes and entrepreneurship, they are not able to address individual-level decisions to enter or remain in an entrepreneurial activity. The finding that higher tax rates lead to more self-employment as measured by aggregate time series, while interesting, has not been confirmed by the most recent time series studies.¹² A better understanding of this relationship is only possible through the analysis of cross-section or panel data.

While the initial evidence from early cross-section studies generally supported the time-series results,¹³ more recent cross-sectional research casts doubt on the importance of tax policy in the self-employment decision. Parker (2003) found no evidence that the decision to be self-employed is sensitive to taxes or opportunities for evasion, pointing to earlier studies' omission of relative incomes between self-employment and wage employment as a reason for their finding of significant tax effects.

The most significant shortcoming of these cross-sectional studies, all of which have used individual tax information, is that potential tax rate (and relative income) endogeneity was not addressed. Also, with the exception of Parker (2003) who eventually dismissed the issue, time series and cross-section studies had not yet considered the relative tax treatment of wage employment and self-employment. To the extent that tax policies treat each type of employment differently, the resulting tax wedge could have important consequences for self-employment rates. Further, most studies have focused on the (cross-sectional) probability of being self-employed rather than the

¹² See Fairlie and Meyer (1998), Briscoe, Dainty, and Millett (2000), and Bruce and Mohsin (2003).

¹³ See Long (1982a), Long (1982b), or Moore (1983).

equally interesting start-up and shut down processes. While a number of time-series and cross-section studies have considered self-employment entry and exit, none considered taxes. A few more recent studies have used panel data to investigate these broad questions.

The availability of richly detailed longitudinal data at the individual level has been a boon to empirical research on taxes and self-employment. Panel data studies and those relying on repeated cross-sections have been able to focus on individual decisions about self-employment (Bruce 2000 and 2002, Carroll, Holtz-Eakin, Rider, and Rosen 2001, Cullen and Gordon 2002, Gentry and Hubbard 2000, Moore 2003, and Schuetze 2000). Results have been less conclusive than those from earlier time-series and cross-section studies. Indeed, some of the more recent studies have indicated that higher tax rates on self-employment income might either increase or decrease self-employment rates. The key to understanding this is recalling that a higher tax rate reduces not only the expected return from entrepreneurial activity, but may also reduce the risk of the entrepreneurial venture.

Schuetze (2000) avoided the pitfalls of tax rate endogeneity by using asynchronous variation in the aggregate “tax climate” across tax jurisdictions (states and provinces) in the United States and Canada – two countries which are similar in terms of overall institutional structure but which differ substantially in their income tax policies and self-employment outcomes. Using repeated cross-sections for the two countries covering the period 1983 through 1994, he found that increases in average income tax rates had large and positive effects on the rate of male self-employment.

Bruce (2000 and 2002) used U.S. data from the Panel Study of Income Dynamics to show that the differential tax treatment of the self-employed has statistically significant, although somewhat counter-intuitive effects on the probabilities of entering and exiting self-employment. Both of these studies involved the use of exogenous changes in tax rules to generate instrumental variables for addressing the possible endogeneity of individual-specific tax rates. Results showed that decreasing an individual's expected marginal tax rate on self-employment income (holding the wage tax rate constant) actually reduced the probability of entry, while a similar decrease in the average self-employment income tax rate increased this probability. Similarly, higher tax rates on self-employment income were found to reduce the probability of exit. 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).

Cullen and Gordon (2002) echoed the general finding from the earlier literature that cutting personal tax rates can reduce the extent of entrepreneurial activity. They attributed this not only to the standard Domar and Musgrave (1944) risk-sharing argument within the personal income tax system, described above, but also to similar arguments regarding relative tax rates on corporate and individual income. While their study made use of repeated cross sections of U.S. tax return data from 1964 through 1993, their focus was on a much more limited definition of entrepreneurship than those

found in most other analyses.¹⁴ They also used aggregate (averaged) tax measures to avoid concerns of tax rate endogeneity.

Two recent papers have called the conventional wisdom into question. Gentry and Hubbard (2000) used the same data as Bruce (2000) but focused instead on tax progressivity. They found that the probability of entry into self-employment increased as tax rates became less progressive, indicating that progressive rate schedules serve as something of a tax on success in self-employment. Moore (2003) used repeated cross section data from the Surveys of Consumer Finances, which spanned key federal tax reforms in the U.S. This strategy permitted the use of difference-in-differences technique to account for tax rate endogeneity. Moore found a negative relationship between tax rates and self-employment, but coefficients were either statistically insignificant or sensitive to model specification.

Leaving the question of how taxes affect the level of entrepreneurial activity aside for the moment, a number of innovative and interesting panel data studies have examined the effects of certain tax policies on the activities of existing entrepreneurs. Wu (2005) examines the effects of taxes on the reported rates of return from privately held businesses and finds a large, positive tax elasticity.¹⁵ Carroll, Holtz-Eakin, Rider, and Rosen (2000a, 2000b, and 2001) used a panel of taxpayer data to examine the effect of taxes on the growth of small firms' receipts and on decisions by existing entrepreneurs to hire additional workers or to make capital investments. Relying on exogenous variation provided by the Tax Reform Act of 1986, they suggested that the self-employed were

¹⁴ Cullen and Gordon (2002) 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 the analysis to tax returns filed by single individuals.

¹⁵ Wu uses a panel of data from the Survey of Consumer Finances (1983-1989).

indeed cognizant of their own personal tax situations. Specifically, marginal tax rate increases reduced overall firm growth (as measured by receipts), mean investment expenditures, and the probability of hiring employees.

Power and Rider (2002) examined a panel of sole proprietors in their investigation of the use of tax-based savings incentives among entrepreneurs. Their estimate of the tax price elasticity of contributions to these plans was about -2.0 , suggesting again that entrepreneurs are highly sensitive to changes in their tax rates. Finally, Barbour, Bruce, and Holtz-Eakin (2002) used a panel of individual taxpayer data from 1979 to 1990 to investigate charitable giving among entrepreneurs. Results indicated that single taxpayers who filed a Schedule C and itemized their deductions were more likely to report charitable contributions than those without a Schedule C, but this result held only at lower marginal income tax rates. These filers were also less sensitive to changes in marginal tax rates than those who did not file a Schedule C.

My research builds upon the earlier literature in a number of important ways. First, following the general methodology of Bruce (2000 and 2002), I consider separately the tax treatment of income from wage-and-salary employment and entrepreneurial activity. My analysis also provides an innovation over previous work by recognizing that most entrepreneurial households have both entrepreneurship and wage income.¹⁶ Second, I examine the importance of taxes at the individual level using tax return data. Third, the use of a twelve-year panel of tax returns allows me to focus on the effects of tax rates on

¹⁶ 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.

transitions into and out of entrepreneurial activity. Finally, I consider the likely endogeneity of individual-level tax rates, making use of exogenous variation in tax rules to construct valid instrumental variables.

I begin by exploring the determinants of entrepreneurial entry in a discrete choice framework. I then treat entrepreneurial exit in a similar fashion, before exploring entrepreneurial survival in a duration analysis framework. A number of studies have examined entrepreneurial survival empirically in a multivariate context (e.g., Bates 1990, Holtz-Eakin, Joulfaian, and Rosen 1994a, and Taylor 1999), but only Bruce (2002) has considered the effects of taxes on entrepreneurial endurance. The current study is believed to be the first to consider the effects of taxes on entrepreneurial survival using duration analysis techniques.

D. Theoretical Framework

Prior theoretical work has followed two main approaches to examine the effects of taxes on entrepreneurship. In relative risk models, a representative individual allocates work effort between wage and salary employment, with a certain income, and the entrepreneurial sector, with an uncertain income (Bruce 2000 and 2002, Cullen and Gordon 2002). A change in the tax rate in these models produces an ambiguous effect on the portion of labor effort allocated to the entrepreneurial activity. The tax effects in theoretical models that examine evasion decisions also yield ambiguous results that depend crucially on risk attitudes (Watson 1985, Kesselman 1989).

Thus far, the literature does not contain a model that combines the relative risk framework with evasion opportunities. In order to gain insight into decisions made by households in a context which includes both a relatively more risky entrepreneurial sector

and opportunities for evasion, consider the following simple model. A representative individual receives income $I = \omega(1 - \varepsilon)(1 - \tau_w) + \theta\varepsilon(1 - \tau_s) + (1 - \theta)s\varepsilon$ if he or she is not audited and $I = \omega(1 - \varepsilon)(1 - \tau_w) + \theta\varepsilon(1 - \tau_s) + (1 - \theta)s\varepsilon - (\tau_s + \rho)(1 - \theta)s\varepsilon$ if there is an audit. The wage rate is represented by ω and $(1 - \varepsilon)$ represents the amount of labor allocated to wage and salary employment. For simplicity, I assume that the individual has one unit of labor and divides this unit between the two sectors.¹⁷ Wage and salary income can be perfectly monitored by a government agency (due to third party reporting) but entrepreneurial income is subject to voluntary compliance. In other words, the individual can evade taxes on entrepreneurial income by reporting less than actual net profits or by overstating losses.

Marginal tax rates are represented by τ_w (wage and salary) and τ_s (entrepreneurial income). The portion of entrepreneurial income reported is θ and ρ represents the penalty rate for evasion (the penalty rate is applied to the amount of evaded income). The return to entrepreneurial activity, s , is assumed to be normally distributed with a mean of μ_s and a variance of σ_s^2 .

Let π equal the (known) probability of audit so that expected income net of taxes is equal to $\omega(1 - \varepsilon)(1 - \tau_w) + \mu_s\varepsilon(\theta\alpha + \lambda)$

(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

¹⁷ Following much of the theoretical literature I focus only on the relative decision by assuming that total labor supply is fixed.

entrepreneurship (ε) and what percentage of (positive) entrepreneurial income to report (θ). In the spirit of Cullen and Gordon (2002), the individual's utility depends on the expected value of income and the variance of income:

$$U(I) = E(I) - \beta(\theta\alpha + \lambda) \text{var}(I) \quad (2)$$

Note that utility generally falls as the variance of income increases but β is included to account for heterogeneity in risk preferences.¹⁸ 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:

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

$$\varepsilon = \frac{\mu_s^3}{3^3 \beta \sigma_s^2 [\omega(1-\tau_w)]^2}$$

Given my focus on reported entrepreneurial income on tax returns, as described more fully below, I focus on θ . In the subsequent empirical analyses, the presence of entrepreneurial income reported by the tax filer is used to determine whether or not the household is entrepreneurial. Under this identification scheme, only households with $\theta > 0$ are observed as entrepreneurs. In order for $\theta > 0$ to hold, the returns to entrepreneurship (taking into account the probability of audit) must be large enough relative to the returns from wage and salary employment.¹⁹

¹⁸ The additional term used to scale the variance is simply a convenient combination of the model's parameters intended to simplify subsequent calculations.

¹⁹ Note that this requires $\frac{3\omega(1-\tau_w) - \mu_s \lambda}{\mu_s \alpha} > 0$. 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 $\mu_s \lambda > 3\omega(1-\tau_w)$.

The probability of observing entrepreneurial activity ($\theta > 0$) in the tax return data increases with the expected returns to the entrepreneurial activity (μ_s) and the marginal tax rate on wage and salary income (τ_w). The probability of $\theta > 0$ decreases with the entrepreneurial tax rate (τ_s), the penalty for evasion (ρ), and the wage rate (ω). This produces clear hypotheses for the empirical work that follows. Given this model, I expect marginal tax rates to have opposing effects. A higher relative tax rate on wage and salary income, all else equal, is expected to increase the probability of observing a household in an entrepreneurial activity whereas a higher tax rate on entrepreneurial income is expected to have the reverse effect.

I now move to a discussion of other useful comparative statics produced by this model. Beginning with tax rates, the partial derivative of the portion of entrepreneurial income reported to the tax authorities (θ) with respect to the marginal tax rate on wage and salary income (τ_w) is positive. This indicates an increase in the wage marginal tax rate leads to an increase in the percentage of entrepreneurial income reported. In this case, the household responds to the lower relative returns to labor income by reducing the uncertainty it faces in entrepreneurial income (due to the possibility of audit). The relationship between τ_s and θ is more complicated. However, it can be shown that the share of entrepreneurial income reported decreases as the marginal tax rate on entrepreneurial income (τ_s) increases as long as the entrepreneurial returns are not too great relative to the returns from wage and salary work.²⁰

²⁰ This requires that: $\mu_s < \frac{3\omega(1-\pi)(1-\tau_w)}{1-\pi(1+\rho)}$. For illustration, assume an audit rate of 0.03, a penalty rate of 1, and a tax rate on wage income of 0.28. The inequality now becomes: $\mu_s < 2.23\omega$.

Beyond tax rates, it can be shown that the share of entrepreneurial income reported to tax authorities is a positive function of the returns to entrepreneurship and a negative function of the returns to wage and salary employment. This latter effect occurs as the higher relative wage earnings (and a reduced expected penalty) offset the additional taxes paid on entrepreneurial income. Unsurprisingly, only the expected return to entrepreneurship matters as the variance of income has no effect on the optimal share of entrepreneurial income reported.

I now consider the determinants of the portion of total labor allocated to entrepreneurial ventures (ϵ). It is worth noting that these hypotheses are not directly testable with the tax return data as I do not observe the values of ϵ . Again beginning with tax rates, the model predicts a positive relationship between the marginal tax rate on wage income (τ_w) and the amount of labor allocated to entrepreneurial activity. Intuitively, the increase in τ_w reduces the relative returns to wage and salary employment causing the individual to shift more of his or her time to the entrepreneurial activity. Perhaps surprisingly, there is no relationship between the optimal portion of labor devoted to entrepreneurship (ϵ) and the tax rate on entrepreneurial income (τ_s).²¹

A negative relationship exists between the amount of labor allocated to entrepreneurial activity, the variance of income (σ_s^2) and the returns to wage and salary

²¹ The household is only concerned with the tax rate on wage and salary income when deciding how to distribute labor between the two sectors. This result arises as the household optimally adjusts the percent of entrepreneurial income it reports in addition to deciding how much of the entrepreneurial activity to undertake (in essence, the household can adjust the effective tax rate on entrepreneurial income so the statutory rate, or full-compliance rate is of little consequence in labor allocation decisions). It is also worth noting that if $\tau_s = \tau_w = \tau$, then there is a positive relationship between the tax rate and the amount of labor allocated to the entrepreneurial activity (even though the household is only concerned about the tax rate as it applies to wage and salary income). If the portion of labor allocated to entrepreneurial activities (ϵ) better represents the measure of entrepreneurship used in previous studies this might help explain the consistently positive relationship between taxes and entrepreneurship.

work (ω). The share of labor dedicated to entrepreneurship increases with expected returns to entrepreneurship (μ_s).

In short, the model provides two clear hypotheses regarding the effects of tax rates on entrepreneurship observed in the tax return data. First, I expect a positive relationship between entrepreneurship and the marginal tax rate on wage and salary income. Second, the relationship between entrepreneurship and the marginal tax rate on entrepreneurial income is expected to be negative.

E. 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.²²

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 of data used in the most similar prior study (Bruce

²² Note that amended returns filed in later years are reassigned to the appropriate tax year.

2000), allowing for important comparisons to be made. Furthermore, 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 more current and future policies.

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. 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 of what activities qualify as entrepreneurial diminish the precision of survey classifications.

Another source of added precision over survey data is the detailed nature and accuracy of tax related information. 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. The drawback of using tax return data—lack of detailed demographic information—is discussed in greater detail below along with variables that are likely to provide at least a rough proxy for the missing information.

One of the most important advantages of using tax return data is that they provide a number of categories of entrepreneurial activity at the individual level. This allows me to test the robustness of my results to the measure of entrepreneurship, an option not

available in most of the previous literature. I begin with the most straightforward definition of entrepreneurship: sole proprietorships (as evidenced by the presence of a Schedule C).²³ I refer to this as Measure 1. I also explore two increasingly broader definitions of entrepreneurship. Measure 2 adds to Measure 1 those with income from partnerships or subchapter S corporations.²⁴ Finally, Measure 3 adds to Measure 2 those filers with rental or royalty income. Survey data typically capture the first three of these as “self-employed,” but researchers often omit those in the latter categories (rent and royalty income) as “partially” entrepreneurial. These measures mirror 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.

Entrepreneurship rates for the three measures over the time period are presented in Figures 1 through 3.²⁵ Figure 1 indicates that entrepreneurship rates generally rose over the time period of my analysis, with most of the growth occurring before 1987, and remained roughly stable from 1987 until the end of the time period. Given that the data are at the household (tax filer) level, dividing the sample by marital status seems

²³ I 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 or losses (filing a Schedule C for measure 1), I do not classify the household as entrepreneurial. Therefore, to the extent that households begin entrepreneurial activities and choose not to report the activity to the taxing authority, my 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, I identify them as entrepreneurial, overstating entry.

²⁴ Partnership, subchapter S corporation, and rent and royalty income are determined from entries on Schedule E. Other income (or losses) reported on the Schedule E, including income from estates and trusts is not used to classify filers as entrepreneurial.

²⁵ Please note that all tables and figures are located in the Appendices. The measures presented in the figures are identical to those reported in Bruce and Holtz-Eakin (2001) with the exception of the broadest measure in which missing values in rent and royalty income fields are coded as zeros (not entrepreneurs) instead of ones (entrepreneurs).

necessary on at least two grounds.²⁶ 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 and increasing the likelihood of exit for those who do become entrepreneurs.

Figures 2 and 3 add credibility to the argument that single and married filers behave differently. Entrepreneurship rates for married filers (Figure 3) exhibited a remarkably stable upward trend for all three measures. Rates among single filers (Figure 2) were much less stable with periods of relatively rapid increases and decreases. However, the pattern appears to be mainly driven by Schedule C filers and is quite similar across measures. Given the observable differences, all further analysis is conducted separately for single and married filers.

Interestingly, none of the trends exhibited increased volatility around key tax policy changes. Despite a leveling of the payroll tax playing field in 1984, the marginal income tax rate reduction in 1986, and the general scaling-back of tax preferences throughout this time period, the general increase in entrepreneurial activity appears to

²⁶ 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.

have been uninterrupted.

Entrepreneurship rates are a function of both entry rates and exit rates. I 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. Similarly, exit is defined as having entrepreneurial activity in one year but not the next. I should note that exit in no way implies failure, as many small businesses are successful at closure (Headd 2003). The overall increase in entrepreneurial activity over the time period could be driven either by an increase in the rate of entry or a decrease in exit rates, or some combination of both effects. Indeed, entry rates (Figures 4 through 6) and exit rates (Figures 7 through 9) indicate that the broadly stable increase in entrepreneurship rates masks significant variations in entry and exit rates.

Entry rates generally rose over the course of 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. Nonetheless, the general upward trend is consistent with the overall increase in entrepreneurship shown in Figure 1. In comparison to Figure 1, however, entry rates are “noisier” and display more year-to-year fluctuation. Entry rates for the single or unmarried filers (Figure 5) are particularly volatile.

The same characteristic (noise) is exhibited by exit rates, as shown in Figures 7 through 9. However, exit rates have some features that are quite different from those of overall entrepreneurship rates and entrepreneurial entry rates. First, exit rates for single returns are *higher* than for joint returns (the opposite is true for both entry rates and the overall rate of entrepreneurship). Second, in this instance the measure of entrepreneurial

activity is more important. Exit rates often move in opposite directions for different measures of entrepreneurship. For single filers, the broadest measure is least volatile while the opposite generally holds for married filers.

Interestingly, exit rates do not display an upward spike around the key payroll tax reform of the mid-1980s. This lack of a response is perhaps partially responsible for the more stable increase in overall activity as shown in Figure 1. Regardless of the measure of entrepreneurship, entry rates increased and exit rates decreased over time for married returns, leading to an overall increase in entrepreneurship. This is perhaps a result of the general increase in self-employment among women, and married women in particular (Devine 1994, Bruce 1999). Results for single filers are more sensitive to measurement issues, as the exit rate rises by a smaller amount when the broader measure is used. Overall entrepreneurship rates and entry rates rise by similar amounts over time for single filers regardless of the measure.

The results presented above suggest a simple story: entrepreneurship was on the rise during the 1980s, driven both by increased entry of new entrepreneurs and enhanced survival entrepreneurial activities (the evidence is a bit less clear-cut on the latter point). Explanations for this vary; while popular discussion focuses on an increased “taste” or proclivity for entrepreneurship, econometric research has focused on the degree to which a variety of constraints such as taxes, access to capital, health insurance, or discrimination have determined rates of entrepreneurship over time, across space, or among races.²⁷

²⁷For example, see Evans and Jovanovic (1989), Evans and Leighton (1989), Holtz-Eakin, Joulfaian, and Rosen (1994a and 1994b), Blanchflower and Oswald (1998), Dunn and Holtz-Eakin (2000), and Bruce, Holtz-Eakin and Quinn (2000) on the role of capital market constraints; Holtz-Eakin, Penrod, and Rosen (1996) or Bruce, Holtz-Eakin, and Quinn (2000) on the effects of health insurance; and Meyer (1990), Blanchflower, Levine, and Zimmerman (1998), and Fairlie and Meyer (2000) on the effects of race.

F. Entry Analysis: Empirical Methodology and Results

I begin by estimating discrete choice models to examine the effects of taxes on a tax filer's entrepreneurial entry decision, estimating an equation of the following form:

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

where $D_{i,t+1}$ is a binary variable that takes a value of 1 if an individual transitions from not having 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 $t + 1$).²⁸ $X_{i,t}$ is a vector containing a constant and a set of exogenous control variables defined as of time t . Potential post-transition tax rates are calculated separately for each individual, discussed in greater detail below, and included in $T_{i,t+1}$. The coefficients on the two tax variables are used to test the earlier theoretical prediction that entrepreneurial entry increases with the tax rate on wage and salary income and decreases with the tax rate on entrepreneurial income. The error term in this equation includes an individual-specific time-invariant random effect (μ_i) to capture unobserved individual heterogeneity, and an independently and identically distributed residual component ($v_{i,t+1}$) with zero mean and finite variance. A convenient empirical specification for the above equation is a random effects probit, as in Bruce (2000 and 2002).²⁹

²⁸ Note that this results in a two-year transition period (the filer must be present in both years t and $t+1$ to be included in the analysis. Transition periods are pooled together for the analysis. This means that each entry is treated as a separate transition in the analysis if a household has multiple entries. Multiple entries by a household do occur in the data but are not common. Almost 90 percent of the 4,495 filers with at least one entry into an entrepreneurial activity had only one entry. Roughly 9 percent entered twice and 2 percent of households entered three or four times (no household had more than 4 entries).

²⁹ 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 my sample in such a fashion. However, separate analyses are conducted for married and single households. In the case of a single filer, the household self-employment decision is equivalent to the individual decision.

Estimating Tax Rates

The effects of taxes on entry are assessed by calculating the tax rates faced by an individual in each of the two outcomes: entrepreneurship and wage employment. Of course, I only observe one of these outcomes and must therefore estimate hypothetical tax rates for the alternative outcome. To do so, I must first predict income for the alternative outcome. For example, for a tax filer who enters entrepreneurship, I can easily measure their entrepreneurship tax rate by examining their actual post-transition income, etc. I must estimate their hypothetical wage-sector tax rate—the tax rate that they would have faced if they had not entered entrepreneurial activity. For those who do not enter entrepreneurship, I must estimate their hypothetical entrepreneurial income.

I 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 provide an inaccurate assessment of that filer's tax situation. I would have a similar situation if I only estimated entrepreneurial income for non-entrepreneurs. In terms of estimation, this requires me to predict wage and salary income as well as entrepreneurial income for those who do not transition into 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.

My strategy for predicting income is to run ordinary least squares (OLS) regressions of observed income for a given sector by year and filing status 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 parameters from each regression are used to predict incomes for tax filers in the alternative sector. Rather than present the regression results for all of these models, I provide plots of average actual and predicted incomes for the first entrepreneurship measure (Schedule C) in Figures 10 through 15.³⁰

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 those households who self-select into entrepreneurship and those who 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.

In Figure 10, 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 11 and 12). These patterns were nearly identical for married filers (Figures 13 through 15) 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, I am confident that my income predictions result in accurate estimates of the relevant tax rates.

³⁰ Full results from the income-prediction regressions are available upon request from the authors.

With the income estimates in hand, I 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.³¹ I 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.³²

The TAXSIM model allows marginal tax rates to be calculated with respect to either the primary earner's wage income or other income. This is a potentially important distinction as entrepreneurial income can be included in either or both fields in order to maximize accuracy in rate calculations. Although TAXSIM instructions call for wage and entrepreneurial income to be reported in the wage field, negative values are not permitted. However, simply reporting all entrepreneurial income in the "other income" field would not lead to correct Earned Income Tax Credit (EITC) calculations. In order to appropriately count positive net labor earnings (inclusive of entrepreneurial income) for EITC eligibility, entrepreneurial income is added to wage earnings. If the sum of the two incomes is negative, wage earnings are offset to zero and the remaining negative

³¹ TAXSIM can be thought of as a virtual tax form or calculator which can take limited information from survey data or other sources and estimate 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. The TAXSIM model is accessible at <http://www.nber.org/taxsim>. For more details, see Feenberg and Coutts (1993).

³² For purposes of comparability, I 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. I 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. An alternative specification would be to use the full compliance tax rate for the next dollar earned. However, I observe only reported income in the tax return data and cannot assess the level of evasion. In the case that the full compliance tax rate is most appropriate for the analysis, I 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 I have understated the gap between the wage and salary tax rate and the entrepreneurial tax rate by overestimating the entrepreneurial marginal tax rate.

amount is subtracted from other income.

State income tax rates are also calculated by the TAXSIM model and are included in the analysis. Following the most recent literature, I also include estimates of individual payroll tax rates.³³ Federal and state income taxes are combined with payroll taxes to arrive at a single tax rate for each outcome. Separate analyses are conducted using marginal and average tax rates as the previous literature suggests that responses vary with different tax rate measures.³⁴

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 (as indicated by the presence of a Schedule C, 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, although those who did

³³ Payroll taxes might be expected to have smaller effects on transition probabilities, primarily because the payment of Social Security and Medicare taxes is associated with clearly defined benefits. It should be noted, however, that the time period in this analysis is characterized by rate increases for the self-employed relative to wage-and-salary workers without equivalent relative benefit increases. In computing payroll tax rates for wage employment, I assume that workers are responsible for both employer and employee contributions. This assumption is inline with the tax incidence literature. For empirical evidence on who bears the burden of payroll taxes see Gruber (1995) and Moore (1983). For a theoretical treatment see Itaya (1991). In calculating payroll tax rates for joint filers, I 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). I 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. Nearly 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.

³⁴ Average tax rates are calculated as ratios of tax payments to adjusted gross income.

not enter entrepreneurship had slightly higher MTRs in the wage sector.

The story is somewhat similar when looking at entrepreneurial exit, as shown in the bottom half of Table 1. Among single filers, entrepreneurial tax rates were only lower than wage tax rates for those who did not exit, and then only for MTRs. Single filers who exited would have had higher tax rates on average if they had remained in entrepreneurship. Married filers who did not exit entrepreneurship enjoyed lower tax rates in entrepreneurial activity. Those who exited would have had a lower MTR but a higher ATR on average if they had remained in entrepreneurship.

Additional Independent Variables

The tax return panel provides more in terms of other control variables than might be immediately apparent. I 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 claimed for children living at home provides a proxy for household size. I also include the number of children living away from home and the total number of exemptions claimed.

The presence of financial constraints limiting entrepreneurship is an often-cited argument for government intervention. For filers who itemize their deductions, I 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). While those with housing equity might be more likely to have access to sources of loanable funds, it might also be the case that the presence of a mortgage limits the household's ability to obtain financing.

Risk attitudes are also thought to be important in whether or not an individual

becomes an entrepreneur. In an attempt to capture a household's risk attitude, I include a measure of the balance due on the tax return. My motivation for including this is that it seems plausible that more risk averse households should be more likely to over-withhold their taxes, thereby receiving a refund from the IRS. Relatively risk-loving filers might prefer to under-withhold such that the money is available for alternative uses.

Finally, I make use of aggregations of state identifiers in the tax panel to control for region of residence. Locations (such as Guam) outside of the 50 U.S. states and the District of Columbia are represented using an indicator for "other region." Another indicator for "missing region" is also necessary as the state identifiers are omitted for any return with an adjusted gross income of \$200,000 or more in order to guarantee confidentiality.³⁵

Summary statistics for the non-tax variables are shown in Table 2.³⁶ Note that entry rates are larger and exit rates smaller on average the more inclusive the entrepreneurship measure. Roughly one in ten filers claims an age 65 exemption. Filers are fairly evenly distributed across the West, Midwest, and Northeast regions (South is the omitted reference category). Between roughly one-tenth and one-quarter of single filers and about 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 sufficient variation for my estimation purposes, with the entry samples receiving refunds on average (negative balance due) and the exit

³⁵ Dummy variables indicating the year in which the return was filed (time $t + 1$) are also included to account for time effects. Note that factors affecting entrepreneurship at the macro level (nationally) should be accounted for by these time variables. Dummy variables for state of residence and further parameters identified in the theoretical model that might vary at the state level, such as penalty or audit rates are not included in the estimation as I have insufficient sample sizes at the state level.

³⁶ Additional information on variables used in the analysis can be found in Appendix Table 1.

samples owing money on average.³⁷

Are Tax Rates Endogenous?

An issue only recently addressed in the literature is that of the potential endogeneity of the calculated tax rates. In other words, whether or not an individual moves from wage-and-salary employment to entrepreneurship might have some effect on his or her calculated tax rates. Endogeneity is addressed here using the instrumental variable approach applied by Bruce (2000 and 2002). This approach requires an additional set of tax rates from the TAXSIM model. The potentially endogenous tax rates discussed above are calculated using incomes and tax rules as of time $t + 1$, representing the closest approximation to actual post-transition tax rates.

I calculate a second set of tax rates for each individual using time $t + 1$ income and time t tax rules. These are the best approximations of the tax rates that would have existed had the tax rules remained constant. The instrumental variable is then defined as the difference between the first (using time $t + 1$ tax rules) and second (using time t tax rules) tax rates, and represents the part of the actual rate that is caused by the change in the tax code only. 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.³⁸

³⁷ 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. In addition, there is no way to estimate an hourly wage rate from the tax return data for either type of income (entrepreneurial and wage and salary).

³⁸ 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. I explore this approach as a robustness check below.

Results: Econometric Analysis of Entrepreneurial Entry

Table 3 presents my 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 increased 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.³⁹ Beginning with the former, my results support the conventional wisdom. Specifically, increasing the wage-sector MTR is associated with an increase in the probability of entering entrepreneurship (although the effect is only statistically significant for single filers), while increasing the entrepreneurship MTR is associated with a decrease in the probability of entry.

In a series of endogeneity tests, I reject the null of exogeneity for both tax rates, for both single and married filers.⁴⁰ Therefore, I now turn to the econometrically more appropriate IV results in Table 3.⁴¹ Interestingly, the same general story regarding the tax effects continues to hold after accounting for endogeneity, although the coefficients are now larger and more uniformly statistically significant. Further, the negative effect from

³⁹ My 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, I simply insert fitted values in the second-stage random effects probits. In order to obtain more appropriate standard errors, I bootstrap the random effects probit 50 times. My 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. I found in the baseline entry analysis that, while standard errors increased as a result of the bootstrapping procedure, patterns of significance for the tax variables were unchanged. I am therefore confident that my central conclusions would continue to hold if bootstrapped standard errors were calculated for all remaining models.

⁴⁰ I 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.

⁴¹ Results from first-stage instrumenting equations are provided in Appendix Table 2. Note that my instrumental variables are statistically significant in all first-stage regressions.

the entrepreneurship tax rate is more than double the size of the positive effect of the wage tax rate.

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, the results indicate that cutting the entrepreneurship MTR by one percentage point while holding the wage MTR and all else constant 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.

Given that marginal tax rates are generally blind to the source of income under current law, it is perhaps more relevant to consider the effects of “across the board” tax cuts of equal rates. According to my 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 by 0.84 percentage points (-0.58 plus 1.42) among single filers and 1.49 percentage points (-0.51 plus 2.00) among married filers. These effects are quite large when compared to the average entry rates of 1.6 percent for single filers and 4.2 percent for married filers.

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 on entry for married filers, likely due to the fact that

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 I 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. Additional children away from home increase entry probabilities for both filing status groups. Finally, and perhaps most interestingly, those with a balance due on their tax returns were more likely to enter. While the magnitudes of these effects are indeed quite small, this suggests that my balance due indicator might be serving well as a proxy for risk-taking behavior.

Robustness Checks – Entrepreneurial Entry

A frequent criticism in the related literature is that the chosen measure of entrepreneurship—typically self-employment—is either not broad enough or not narrow enough. Fortunately, the tax return data provide numerous measures of entrepreneurial activity which can be used for econometric analysis. In Table 4, I 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 with the baseline analysis, I present two sets of results for each measure and for each filing status group—one that uses potentially endogenous tax rates (Non-IV) and one that uses fitted values from first-stage instrumental variables regressions (IV). Also

as in the baseline analysis, my endogeneity tests indicate that the latter results are more appropriate, so I focus the discussion here on the IV results. Interestingly, the results from this exercise are very similar to those in the baseline model, suggesting that my general conclusions are robust to alternative measures of entrepreneurship. This echoes the general theme from Bruce and Holtz-Eakin (2001). Most of the remaining findings in Table 4 are also similar to the baseline results in Table 3. One interesting difference is that filers with an age 65 exemption are actually more likely to enter Measure 2 entrepreneurship.

The next 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 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. Each tax rate measures something different. 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. Table 5 presents results for all three measures of entrepreneurship, where each random effects probit uses the IV approach, the more appropriate method as indicated by endogeneity tests. The first notable result in Table 5 is that the results are not nearly as consistent across specifications as were the MTR results in Tables 3 and 4. Magnitudes of many of the coefficients are often implausibly large and many of the signs change from one specification to the next, suggesting a very high degree of sensitivity of the model to the use of ATRs. Given this, I am much more confident in the baseline MTR results above.

Table 6 presents results for 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 tax rate coefficients and standard errors are shown for convenience and brevity. The first of these checks replaces my entrepreneurship MTR, which was taken with respect to the primary earner's income as described above, with an entrepreneurship MTR taken with respect to the filer's "other" income. As expected, this has little to no effect on the baseline results; coefficients are nearly identical.

The second and third checks in Table 6 involve different estimation samples. First, I restrict the analysis to filers whose filing status (single or married) does not change during the panel period. Next, I restrict the analysis to those filers who were present in the panel for all twelve years.⁴² Neither of these restrictions results in dramatically different results, although coefficient magnitudes change slightly in some cases. The central conclusion remains unchanged.⁴³

The final robustness check in Table 6 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 my 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

⁴² 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. See Fitzgerald, Gottschalk and Moffit (1998) for a discussion of attrition in the Michigan Panel Study on Income Dynamics (PSID).

⁴³ 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 were identical to the twelve-year specification in each time period and estimated coefficients were nearly the same.

instrumental variables approach was taken. I 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.⁴⁴

To summarize, I find convincing evidence that marginal tax rates have important effects on entrepreneurial entry decisions. Increases in wage-sector MTRs are found to increase the probability of entry, while increases in entrepreneurship MTRs are found to decrease the probability of entry. These central conclusions are robust to a number of alternative specifications. My 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 across-the-board marginal tax rate cuts might have resulted in more entry.

G. Survival Analysis: Empirical Methodology and Results

The previous section examined entries into an entrepreneurial activity and more specifically, whether or not taxes affected the probability of entry. The current section focuses on households already engaged in an entrepreneurial activity and asks whether taxes play a significant role in the duration of the activity. A number of studies have examined entrepreneurial survival empirically in a multivariate context (e.g., Bates 1990, Holtz-Eakin, Joulfaian, and Rosen 1994a, and Taylor 1999), but only Bruce (2002) has considered the effects of taxes on entrepreneurial endurance.

⁴⁴ 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.

The twelve-year span of the tax panel allows for the use of more sophisticated duration analysis techniques. Given that the median duration of an entrepreneurial activity in the data is between 3 and 4 years, I observe many entire episodes of entrepreneurship from start to finish. I apply state-of-the-art multivariate econometric techniques to examine the *spells* of entrepreneurial activity. This enables me to estimate the probability of exit from an entrepreneurial activity given that exit has not yet occurred, and represents the first use of hazard modeling to investigate the effects of taxes on the survival of entrepreneurial enterprises.

In addition to duration analysis, I estimate discrete choice models, as in Bruce 2002 for comparison purposes and to test the robustness of the results. As in the above entry analysis, I account for wage income among entrepreneurial households, control for the potential endogeneity of tax rates and include the same set of control variables. Exit is defined analogously to entry in the previous chapter; exit occurs if a household is entrepreneurial in a given year (files a Schedule C for Measure 1) and is not entrepreneurial in the following year.

As with entry, Table 1 presents some preliminary evidence that tax rates might play an important role in entrepreneurial exits. Among single filers, entrepreneurial tax rates were only lower than wage tax rates for those who did not exit, and then only for MTRs. Single filers who exited would have had higher tax rates on average if they had remained in entrepreneurship. Married filers who did not exit entrepreneurship enjoyed lower tax rates in entrepreneurial activity. Those who exited would have had a lower MTR but a higher ATR on average if they had remained in entrepreneurship.

Duration Analysis of Entrepreneurial Exit

Rather than treat each annual decision as a separate but econometrically linked process as in the discrete choice approach, duration models examine the entire spell of entrepreneurial activity at once.⁴⁵ A particular advantage of this approach is that the effect of profitability (or success) on survival of the entrepreneurial activity is at least partially accounted for by examining each spell in its entirety. Furthermore, in more sophisticated variants of these models, the covariates are permitted to vary over time during the spell. Of the prior studies of entrepreneurial endurance, only Taylor (1999) used hazard models, but he did not examine the effects of taxes.

Denoting T as a filer's length of time in entrepreneurship in years and t as the current time, the probability that this filer exits entrepreneurship this period given that he has not yet exited can be expressed as $P(t \leq T \leq t + \Delta \mid T \geq t)$, where Δ represents a small increment of time. The limit of $[P(t \leq T \leq t + \Delta \mid T \geq t)] / \Delta$ as Δ goes to zero is known as the *hazard rate*. It is typically assumed that T has a continuous probability distribution function, given by $f(t)$, where the associated cumulative distribution function is $F(t) = \int_0^t f(s)ds = P(T \leq t)$.

I am interested in the probability that a spell lasts at least as long as some length t , which is given by the *survival (or survivor) function*: $S(t) = 1 - F(t) = P(T \geq t)$. The

⁴⁵ The possibility remains that the set of covariates might not account for some of the factors that might influence reentry. I attempted to augment the baseline approach by allowing for unobserved heterogeneity, but these models were unable to converge in most cases. When I was able to get results, the primary conclusions were unchanged. Given my inability to consistently report results that allow for unobservable heterogeneity, I instead report robust standard errors that allow for more general heterogeneity. It should also be noted that, by definition, entrepreneurship spells never end unless an individual makes an observable exit. Consequently, all non-exiting spells in the data are right-censored at the end of the analysis period. My estimation method controls for this, as described in detail by Cleves, Gould, and Gutierrez (2002).

hazard rate $\lambda(t)$ is the rate at which spells are completed immediately after t given that they have lasted at least until t , is related to the survival function as shown in equation (2).

$$\lambda(t) = \lim_{\Delta \rightarrow 0} \frac{P(t \leq T \leq t + \Delta \mid T \geq t)}{\Delta} = \lim_{\Delta \rightarrow 0} \frac{F(t + \Delta) - F(t)}{\Delta S(t)} = \frac{f(t)}{S(t)}. \quad (4)$$

Empirically, hazard models express the hazard rate as a multiplicative function of some baseline hazard, $\lambda_0(t)$, and an exponential function of a set of covariates:

$$\lambda_i(t) = \lambda_0(t) \exp(X_i \beta), \quad (5)$$

where β represents the usual vector of coefficients. Estimation of this type of model involves making a decision about the functional form, if any, of the baseline hazard.

A direct extension of the proportional hazards specification above is the accelerated failure time (AFT) metric, which is the estimation method of choice in the current analysis. Begin by defining τ_i as follows:

$$\tau_i = \exp(-X_i \beta) t_i. \quad (6)$$

With some manipulation and rearranging, the log of the failure (or exit) time t can then be conveniently expressed as a linear function of a set of relevant covariates:

$$\ln(t_i) = X_i \beta + \ln(\tau_i). \quad (7)$$

The natural log of τ_i represents the acceleration parameter (which can roughly be thought of as an error term) in equation (5), the distribution of which determines the particular model in much the same way as the choice of functional form for the baseline hazard in the proportional hazards metric. I chose the lognormal distribution based on a comparison of values for the Akaike (1974) Information Criterion for various specifications. However, results were very similar for models with alternative

distributions.⁴⁶

To avoid problems due to gaps in the panel of data, I restrict this part of the analysis to filers who were in the panel for all twelve years and did not change filing status (single vs. married). An initial look at entrepreneurship spells among those in the data is provided in Table 7. Note that the data restrictions result in a sample of 184 single filers and 1,065 married filers who make a total of 142 and 829 exits, respectively. The Kaplan-Meier Survivor Function provides an estimate, based on the data, of the probability of surviving beyond each time period (Kaplan and Meier 1958). Note that filers in the data have only about a fifty percent chance of “surviving” beyond their fourth year.

Baseline duration model results, using entrepreneurship Measure 1, are shown in Table 8. Results are expressed as time ratios, where values greater than one suggest that an increase in that particular variable increases the length of the entrepreneurship spell. Note that all MTRs are entered as fitted values from the same first-stage instrumenting regressions as in the Chapter 6. Increases in the wage MTR are associated with increases in the length of time in entrepreneurship (i.e., reductions in the probability of exit), while increases in the entrepreneurship MTR are associated with reductions in the length of time in entrepreneurship (i.e., increases in the probability of exit). The estimated time ratios indicate that a one percentage-point increase in the wage MTR would prolong the

⁴⁶ All survival-time models in this paper were estimated with the Stata (version 8) statistical software, which permits the researcher to consider a multitude of distributional assumptions as well as the usual controls for censored data and unobserved heterogeneity. For additional information on these and other methods, interested readers should consult Cleves, Gould, and Gutierrez (2002), Gutierrez (2002), Greene (2000) or Kiefer (1988). Note that in this estimation method, the analysis focuses on the first “failure” so that if a household has more than one exit from entrepreneurial activity, only the first exit is analyzed. This does not appear to be a significant restriction as the vast majority of households that exit entrepreneurship in the data exit only once (91.35 percent).

entrepreneurship spell by 16.1 percent for single filers and 12.7 percent for married filers. A similar increase in the entrepreneurship MTR would reduce the length of the entrepreneurship spell by 32.5 percent for single filers and 44.8 percent for married filers according to these results. While these effects certainly seem large, note that entrepreneurship spells are measured here in years and the median spell length from Table 7 is roughly 3 to 4 years. A one-third reduction in spell length simply indicates that the median entrepreneur would exit about one year earlier in the tax panel.

Most of the remaining covariates are not statistically significant for single filers, presumably due to the small sample size. Married filers with age 65 exemptions, a mortgage interest deduction, or more dependent children at home have shorter entrepreneurial spells. Those with a missing region (AGI greater than \$200,000), more total exemptions, or a larger balance due on their tax return have longer entrepreneurial spells.

Robustness Checks – Entrepreneurship Duration Analysis

Table 9 presents results from a series of alternative specifications. When un-instrumented MTRs or ATRs are used, estimated time ratios for the tax rates are much smaller (closer to one) and largely not statistically significant. This sensitivity to tax rate measures indicates that additional duration modeling of entrepreneurship spells would be a useful undertaking. Nonetheless, my rather consistent finding that tax rates are endogenous and the less conclusive evidence from models with average tax rates both lead me to prefer the use of instrumented marginal tax rates in the duration analysis.

Discrete Choice Analysis of Entrepreneurial Exit

I now turn to a discrete choice analysis of the probability of exit, which simply replaces the entry indicator used in Chapter 6 with a similarly-defined indicator of exit. Results from the baseline model of entrepreneurial exit are presented in Table 10 and are largely consistent with the duration modeling results.⁴⁷ As with the entry analysis, results are shown for models without endogeneity controls (Non-IV) and models with such controls (IV). For both single and married filers, tests indicate a potentially serious endogeneity problem; I will therefore focus the discussion on the more appropriate IV results.

As in the entry and duration analyses, I find that tax rates affect entrepreneurial exit in a manner that is consistent with conventional wisdom. Specifically, reductions in the wage MTR are associated with increases in the probability of exit while reductions in the entrepreneurship MTR are associated with reductions in the probability of exit, all else equal. Again, the effect of the entrepreneurship tax rate is nearly twice the size of that for the wage tax rate. The estimated tax rate coefficients indicate that a one percentage-point cut in the wage MTR, holding the entrepreneurship MTR and all else constant, would increase the probability of exit by 9.17 percentage points for single filers and 3.98 percentage points for married filers. A one percentage point cut in the entrepreneurship MTR, holding the wage MTR and all else constant, would reduce the likelihood of exit by 17.32 percentage points for single filers and 7.81 percentage points for married filers.

My empirical estimates indicate that cutting both the wage and entrepreneurship

⁴⁷ Note that this specification is based on Measure 1 (Schedule C) entrepreneurship.

MTRs simultaneously by one percentage point each would reduce the likelihood of entrepreneurial exit by 8.15 percentage points (17.32 minus 9.17) for single filers and 3.83 percentage points (7.81 minus 3.98) for married filers. These results suggest that the leveling of the playing field during the 1980s might have resulted in more entrepreneurial exit than might have been observed otherwise. The larger magnitudes of these effects relative to those from my analysis of entrepreneurial entry reveal the greater fragility of entrepreneurial activity vis-à-vis wage employment.

I find some interesting effects from the remaining control variables in Table 10. First, only single filers with age 65 exemptions are less likely to exit. Region of residence again plays an important role, suggesting that regional economic factors can be important. Married filers with missing region (i.e., with AGI above \$200,000) are much less likely to exit, unsurprisingly. Having a mortgage interest deduction increases one's likelihood of exit, and by a larger amount for singles than for married filers. Finally, having more dependent children generally reduces the probability of exit, but only for single filers.

Robustness Checks – Discrete Choice Analysis of Entrepreneurial Exit

My central conclusions regarding the effects of marginal tax rates on entrepreneurial exit are robust to the choice of entrepreneurship definition, as shown in Table 11. While coefficient magnitudes fluctuate somewhat with more inclusive definitions of entrepreneurial activity, the signs and significance levels remain unchanged. Regarding the non-tax variables, the only significant departure from the baseline results is that married filers with age 65 exemptions, who are more likely to exit Measure 1 and Measure 2 entrepreneurship, are actually less likely to exit Measure 3

entrepreneurship.

Table 12 presents a series of models using ATRs instead of MTRs. Interestingly, these results are much more precise than the similar models of entrepreneurial entry in Table 5. Note that my tests only revealed endogeneity for entrepreneurship tax rates. Endogeneity was not found to be a problem for single filers with Measure 1. With this, I present non-IV results for single, Measure 1, and partial IV results (with instrumenting only for the entrepreneurship tax rate) for the remaining five models in Table 12. The effects of the entrepreneurship ATR are positive and statistically significant in all six models, corroborating my baseline MTR results. Wage ATRs exhibit much smaller effects, suggesting that entrepreneurial endurance is more a function of tax rates in the entrepreneurial sector than tax rates in the wage sector.

Results for the remaining robustness checks (similar to those for entrepreneurial entry in Table 6) are provided in Table 13. As with entry, all of these results are similar to the baseline exit findings in Table 10. Tax rates have similar effects regardless of how I enter them in the analysis, and regardless of the sample definition.

To summarize the results of the discrete choice analysis of entrepreneurial exit, I find convincing evidence that tax rates matter. Specifically, increases in tax rates on entrepreneurs are found to increase the likelihood of exit, all else equal. Increases in wage-sector tax rates reduce the probability of exit, but these effects are quite small and in some cases approach zero. Taken together, the findings suggest that policies aimed at reducing the relative tax burden on small businesses might lead to increased entrepreneurial endurance. Additionally, equal cuts in both tax rates (wage and entrepreneur) could also result in lower rates of entrepreneurial exit.

H. Conclusions and Suggestions for Future Research

I find convincing evidence that marginal tax rates have important effects on decisions to enter or remain in entrepreneurial activity. Results from discrete-choice models of entrepreneurial entry show that increases in marginal tax rates on wage income increase the probability of entry, while increases in marginal tax rates on entrepreneurship income decrease the probability of entry. In a similar discrete-choice analysis of entrepreneurial exit, I find that increases in entrepreneurship tax rates increase the likelihood of exit, while increases in wage-sector tax rates reduce the probability of exit. Results from duration analysis of entrepreneurial endurance are largely consistent with the discrete-choice findings.

Taken together, my empirical results suggest that policies aimed at reducing the relative tax rates on entrepreneurs might lead to increases in entrepreneurial entry and better chances of survival. Additionally, the results indicate that equal-rate cuts in tax rates on both wage and entrepreneurship incomes could yield similar results. Conversely, equal-rate increases in tax rates on both sources of incomes would most likely result in reduced rates of entrepreneurial entry and increased rates of entrepreneurial exit.

While the central conclusions are robust to a number of alternative specifications, robustness checks reveal a number of important areas for future research. First, the analysis of entry yields different conclusions when I replace marginal tax rates with average tax rates. In this case, I find that higher average tax rates on entrepreneurship income might actually increase the probability of entry. Future analysis should consider the possibility that tax rate increases serve to attract those already prone to tax avoidance or evasion into entrepreneurial activity of one form or another. Second, the duration

analysis results are highly sensitive to the choice of tax rate measures used in the model. Future research should continue to investigate the causes of this sensitivity of my baseline findings. A third suggestion for future work would be to consider the effects of other taxes, namely estate taxes, taxes on corporate income, and the array of taxes at the state and local levels. Despite the voluminous literature on taxes and entrepreneurial activity, very few studies have considered these potentially important taxes.

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Part III

Health Insurance Deductibility and Entrepreneurial Survival

A. Introduction

The general consensus from *Part I* and the empirical literature on taxes and entrepreneurship is that taxes matter for entrepreneurial decisions. However, most of these studies have examined only one facet of the tax system, tax rates. It seems quite plausible that other aspects of the tax system might also influence behavior by making entrepreneurship more or less attractive. A timely example from a policy perspective is the treatment of health insurance premiums paid by the self-employed.

Currently, the self-employed are able to deduct 100 percent of the health insurance premiums they pay for themselves and their dependents in calculating the income tax. Self-employed health insurance premiums are not deductible from payroll tax calculations. Conversely, most premiums paid by employers on behalf of wage and salary employees are not subject to income or payroll taxes. Further, the use of flexible spending accounts allows employees to pay their portion of health insurance premiums out of pre-tax dollars.

Historically, the tax treatment of health insurance premiums was less even. Prior to 1987, the self-employed were not able to deduct health insurance premiums when calculating income tax or payroll tax liabilities. A temporary, 25 percent deduction of health insurance premiums from the calculation of income taxes was implemented in 1987. The temporary deduction was made permanent and increased to 40 percent in 1987. Further incremental increases occurred over the next six years until self-employed health insurance premiums were made fully deductible from the calculation of income

taxes in 2003.⁴⁸ However, as noted above, the 100-percent income tax deduction did not equalize the tax treatment of self-employed health insurance premiums as the income used by the self-employed to pay health insurance premiums is still subject to payroll tax.

The purpose of my analysis is to investigate whether this difference in the relative tax treatment of health insurance premiums affects the duration of entrepreneurial activities. In other words, does increasing the deductibility of health insurance premiums lead to the enhanced survival of current entrepreneurial activities? To assess this issue, I use a short panel of tax return data (1988-1990) that cover the initial implementation of the 25 percent deduction for self-employed health insurance premiums.

This research seeks to inform policymakers on the effects of health insurance tax incentives on entrepreneurial survival. Evidence that the tax incentives improve the duration of entrepreneurial activities would suggest that providing additional incentives by exempting health insurance premiums from the self-employment tax would increase entrepreneurship. Alternatively, if the tax incentives for health insurance are found to have no effect on entrepreneurial survival, policymakers need not consider potentially unintended consequences on entrepreneurial survival and can evaluate policies based on other criteria such as equity or effects on insurance rates.

Results from this study indicate that the presence of the 25 percent deduction for health insurance premiums decreased the probability of exit by 2.65 percentage points for single filers and 10.50 percentage points for married filers. It is clear that these changes in the probability of exit represent large effects when compared with the overall probability of exit, 24.49 for single filers and 16.19 percent for married filers. My results

⁴⁸ See Chapter 10 for more information on the relative tax treatment of health insurance premiums.

also suggest that modest increases in the dollar value of the health insurance deduction can also be used to achieve similar reductions in the probability of exit. These effects suggest that the 2003 increase in the deduction from 75 percent to 100 percent likely enhanced survival. In addition, the results suggest that decreases in the probability of entrepreneurial exit are an important consideration when evaluating policies to allow a health insurance deduction in calculating payroll tax liabilities.

The remainder of this document is organized as follows. Chapter 10 provides a brief history of the relative tax treatment of health insurance premiums paid by entrepreneurs. The prior literature is summarized in Chapter 11. Chapter 12 contains a description of the data and empirical methodology. Results are presented in Chapter 13 and Chapter 14 concludes with policy implications and directions for future work.

B. Health Insurance and Entrepreneurs

To see how health insurance tax incentives might alter entrepreneurial decisions, consider a household that maximizes expected utility, where the utility function depends both on the level and variance of its income. In this context, health insurance provides a safeguard against large payments for health services in the event of an accident or illness.⁴⁹ In this case, higher relative prices for health insurance raise the price faced by entrepreneurs for reducing risk.⁵⁰ If households differ in both risk attitudes and entrepreneurial ability, households affected at the margin might include those with high levels of ability but with lower tolerances for risk. These high ability households, most

⁴⁹ One might test this assertion by examining the health insurance policies purchased by entrepreneurs. A preference for policies designed to protect against low probability, high cost events would add credence to the risk motivation argument.

⁵⁰ Compounding the price effects from differential tax treatment is the fact that entrepreneurs generally face higher insurance premium costs than their wage and salary counterparts as small employers are not able to take advantage of the risk-pooling available to larger firms (Burman et al., 2003).

likely to produce innovations and create new jobs, might forgo an entrepreneurial activity in favor of the relatively more stable wage and salary sector.

To better understand the policy issues I now turn to a more detailed description of the historical tax treatment of health insurance premiums. The employer portion of health insurance premiums paid by firms on behalf of employees was and is not subject to income or payroll taxes. To the extent that employers offer flexible spending accounts that allow employees to pay medical expenses out of pre-tax dollars, employee premium portions might also be exempt from income and payroll taxes.⁵¹

Prior to 1987, the self-employed were not able to deduct income spent on health insurance premiums for themselves, their spouses and dependents when calculating their income tax or payroll tax liabilities. As a result of the Tax Reform Act of 1986 (TRA86), the self-employed (primarily Schedule C and F filers) with net profits were able to deduct 25 percent of their health insurance premiums when calculating income tax liabilities beginning in 1987.⁵² Availability was expanded in 1990 to include filers who were more than two percent shareholders in an S corporation.

The temporary health insurance deduction was allowed to expire in 1992 but was made retroactively available for those filing an amended return (Holtz-Eakin, Penrod, and Rosen, 1996). Temporary deductions were available until 1997 when the deduction was made permanent and increased to 40 percent. Further incremental increases were made in 1998 (45 percent), 1999 (60 percent), and 2002 (79 percent). Effective in 2003, 100 percent of self-employed insurance premiums became deductible in calculating income

⁵¹ It is estimated that the tax expenditure is at least \$120 billion for employer-based health insurance tax-incentives (Burman et al., 2003).

⁵² To claim the deduction filers must have had net profits from their small business and not be eligible for employer-provided health insurance (including spousal plans).

tax liabilities.

As noted above, the 100-percent income tax deduction did not equalize the treatment of health insurance premiums paid on behalf of the self-employed and wage and salary workers. Unlike premiums paid by employers, the self-employed must still pay Self-Employment Contributions Act (SECA), or payroll taxes, on income used to pay insurance premiums for themselves and their dependents.⁵³ Insurance premiums for wage and salary employees are generally paid out of pre-tax dollars; thus, this income is not subject to the Federal income tax or Federal Insurance Contributions Act (FICA) taxes.⁵⁴ Further compounding the issue is the fact that most households now pay more payroll taxes than income taxes (Mitrusi and Poterba, 2000).

The above discussion of the tax treatment of health insurance premiums has focused on expenses incurred by the employer. This represents a full treatment for the self-employed, but wage and salary employees might also incur premium costs for employer-sponsored health insurance programs not covered by their employer. In this case, employers can offer their employees a flexible benefit (cafeteria) plan that allows employee portions of insurance premiums to be paid out of pretax dollars.⁵⁵ Thus, health

⁵³ As the payroll tax contributions define future benefits, adding a SECA exemption is potentially detrimental for those with low income levels. For instance, Feldstein and Samwick (1992) find that the effective Social Security tax rate was negative for those with low earnings in 1990. Deducting income used to pay insurance premiums from SECA calculations would reduce the amount of payroll taxes paid and the value of future benefits. For households with a negative effective tax rate, the gain from avoiding current taxes is more than offset by the loss of future benefits.

⁵⁴ FICA and SECA taxes serve as the primary funding source for the Medicare and Social Security programs.

⁵⁵ Flexible benefit plans are allowed under Section 125 of the Internal Revenue Code (enacted in 1978). The simplest plan for paying employee portions of insurance premiums out of pre-tax dollars is generally called a conversion plan. Under conversion plans, premium payments are deducted from gross income and the reduced income amount is then used to calculate income and payroll taxes. Premium conversion was first available to Federal employees in October 2000. See Internal Revenue Service (undated and 2005) for a more detailed explanation.

insurance premiums paid by employees under employer-sponsored programs are largely deductible in calculating income and payroll taxes. The self-employed can deduct premiums paid when calculating income but not payroll taxes (flexible benefit plans are not available to the self-employed or partnerships).

Differential tax treatment of self-employed and wage and salary health insurance premiums might be expected to affect entrepreneurship rates through two avenues. The relatively higher cost of health insurance might 1) deter entry or 2) expedite exit. Empirical studies of the impacts on entry have produced inconclusive results, as discussed below. This study is the first to examine the effects of health insurance deductibility on the probability of entrepreneurial exit.

Identifying the effects of the health insurance deduction on exits from an entrepreneurial activity is important from an efficiency perspective. To the extent that the differential tax treatment distorts household decisions, it causes inefficiencies as labor is not allocated to its most productive use. For instance, consider an entrepreneurial household weighing the expected benefits of its entrepreneurial activity against the risks. The differential tax treatment increases the relative price of decreasing health related risks. In light of the higher relative price of insurance, the household decides that the cost of reducing the amount of risk it faces is too high and exits the entrepreneurial activity. This outcome is inefficient as resources that would have been devoted to the entrepreneurial activity are now being allocated to the wage and salary sector based only on price differences created by the tax system.

Equity is another concern with the differential tax treatment of health insurance premiums. The current policy results in unequal treatment of taxpayers' health insurance

costs based only on their classification as self-employed or not. Efficiency and equity concerns are likely among those that have prompted recent legislation. Bills introduced during the previous Congress in both the House and Senate sought to make self-employed insurance premiums deductible in calculating SECA taxes.⁵⁶ The current policy debate has dealt more broadly with the health insurance issue by focusing tax-exempt health savings accounts.

The purpose of my research is to add to the policy debate by investigating whether closing the health insurance tax incentive gap between employees and the self-employed enhances entrepreneurial survival. I will examine whether the 25 percent self-employment health insurance deduction implemented under TRA86 had an effect on the probability of entrepreneurial exit. Admittedly, the 25 percent deduction represented a modest savings for a self-employed filer. For example, among those claiming the deduction in 1988, the average value was \$428.⁵⁷ For a household in the 28 percent tax bracket, this represents a tax savings of \$120 or 7 percent of the premium total.⁵⁸

Evidence of a response to this modest tax incentive would suggest that larger incentives, such as the 100 percent income tax deduction or the proposed exemption from SECA taxes, might be expected to generate a behavioral response. Conversely, the absence of an effect would suggest the need for further research and possibly suggest that policymakers can ignore the effects of health insurance deductibility on entrepreneurial

⁵⁶ The house bill was titled the Self-Employed Health Care Affordability Act of 2003 (H.R. 1873, referred to House Ways and Means Committee 4/30/2003) and the companion Senate bill was titled the Equity for Our Nation's Self-Employed Act of 2004 (S. 2433, referred to Senate Finance Committee 5/18/2004).

⁵⁷ Represents the author's calculation from the tax return data.

⁵⁸ A deduction valued at \$428 represents at most a quarter of average premiums paid (this is a lower bound as deductions are only allowed in the presence of profits). Thus, 28 percent of \$428 gives a tax savings of \$120. Dividing this savings by the estimated premium amount (\$1712) gives a deduction worth 7 percent of the premium paid.

decisions when evaluating health insurance related policies. Other possible policy considerations might include the effects of the tax incentives on health insurance coverage and health outcomes.

C. Previous Literature

In summary the differential tax treatment of health insurance premiums paid by entrepreneurs and wage and salary workers might distort decisions to enter or exit an entrepreneurial activity. Under current tax policy, the absence of payroll tax deductibility for entrepreneurial health insurance premiums effectively increases the relative price of health insurance for entrepreneurs. To the extent that entrepreneurs value health insurance, the current policy potentially discourages entrepreneurial activity. Tax incentives might also affect decisions about purchasing health insurance, and consequently, health outcomes.

The literature reviewed in the following section can be divided into three main categories. The first, and most closely related to this study, examines the relationship between health insurance and the probability of entrepreneurship. Two studies have addressed the effects of health insurance availability on entrepreneurship, but neither specifically addresses tax incentives or entrepreneurial survival.

The possibility that employer-provided insurance creates job-lock and discourages transitions to entrepreneurship is examined by Holtz-Eakin, Penrod, and Rosen (1996). The authors use longitudinal data from the Survey of Income and Program Participation and a difference in differences approach to compare wage and salary individuals with individuals who transition into self-employment. They find no statistically significant effects of health insurance portability on transitions into entrepreneurship.

Results from a more recent study seem to contradict these conclusions.

Wellington (2004) considers the effects of health insurance coverage on the probability of entrepreneurship. She uses a cross-section of data from the 1993 Current Population Survey and finds that the availability of coverage from another source (spouse) increases the likelihood of entrepreneurship between 2 and 5 percentage points.

The second strain of literature takes a broader perspective, and addresses the general effectiveness of tax incentives. Several studies focus specifically on the effectiveness of tax incentives to encourage health insurance coverage.⁵⁹ Examining small and large firms alike, Gruber and Lettau (2004) find that firms are quite responsive to health insurance tax incentives. Small firms (less than 100 employees) were most responsive in their decisions to offer insurance as an employee benefit. Large firms (more than 1,000 employees) were more responsive in levels of spending on employee health premiums. The authors conclude that tax incentives are critical for maintaining an employer-provided health insurance system.

The decision to offer health insurance is also explored by Gruber and Poterba (1994). Their results suggest that a one percent increase in the price of insurance reduces the probability that a single, self-employed person will purchase health insurance by nearly two percentage points. The conclusion that firms, including the self-employed, are quite responsive to health insurance tax incentives is echoed in a study of the responsiveness of the self-employed to tax incentives targeted at savings (Power and Rider 2002). The self-employed are more likely to contribute to tax-deferred retirement savings plans and contribute more as the after-tax price declines. In addition, Bruce

⁵⁹ See Feldstein (1973).

(2002) and *Part I* provide evidence that taxes have a significant affect on entrepreneurial endurance, but the authors only consider tax rates.⁶⁰

The final subset of literature addresses health insurance rates and health outcomes among the self-employed. Results suggest that despite lower rates of health insurance, the self-employed experience the same health outcomes as their wage and salary counterparts.⁶¹ There is no evidence of a selection bias as the health status of those entering entrepreneurship is indistinguishable from those who remain in wage and salary employment.⁶² Additionally, health status is not a significant predictor of exit from an entrepreneurial activity.⁶³ Thus, the literature does not support tax incentives for health insurance as an effective policy for improving health outcomes.

In summary the literature provides a general guideline for thinking about the issue of health insurance tax incentives and entrepreneurship. First, the evidence on whether health insurance availability effects decisions to undertake an entrepreneurial activity is mixed. Second, entrepreneurs are generally responsive to tax incentives and particularly in their decisions to purchase health insurance suggesting that tax incentives might indeed be expected to generate behavioral effects. Finally, lower rates of health insurance among the self-employed do not lead to relatively worse health outcomes. This last point

⁶⁰ A number of studies have examined entrepreneurial survival empirically in a multivariate context (e.g., Bates 1990, Holtz-Eakin, Joulfaian, and Rosen 1994, and Taylor 1999), but these studies do not address the effects of taxes.

⁶¹ See Holtz-Eakin, Penrod, and Rosen (1996), Health Insurance Association of America (2003) and Perry and Rosen (2004) for evidence on lower rates of health insurance coverage among the self-employed. Perry and Rosen (2004) estimate that the self-employed are 25 percent less likely to be insured than their wage and salary counterparts. See Currie and Gruber (1996), Ross and Mirowsky (2000), Meara (2001), Newhouse (1993) and Perry and Rosen (2004) for evidence on the weak link between health coverage and health outcomes.

⁶² See Holtz-Eakin, Penrod, and Rosen (1996).

⁶³ See Holtz-Eakin, Penrod, and Rosen (1996) and Perry and Rosen (2004).

is essential to the policy debate as it suggests that concerns other than health outcomes, including equity of the tax system and the effects of tax incentives on entrepreneurial survival, might be most relevant in policy discussions.

I contribute to the existing literature in several important ways. First, entrepreneurship rates are a function of both entries and exits. An observed increase in entrepreneurship might be attributed to an increase in entrepreneurial entry, a decrease in entrepreneurial exit, or a combination of both. Previous work has focused on entrepreneurship rates or transitions into entrepreneurship. This study is the first to address the effects of tax incentives for health insurance on the probability of exiting an entrepreneurial activity.

My second contribution is to go beyond tax rates to examine the effects of another aspect of the tax code, health insurance deductibility. This enables me to add to the policy debate over whether or not the self-employed should incur payroll taxes on income used to purchase health insurance. The option of allowing a deduction for health insurance premiums in calculating SECA taxes is less drastic and perhaps more politically feasible than other studies which have focused on the likely effects of universal health coverage. In addition, I make use of a panel of tax return data (described in more detail below) which represent the most accurate, publicly available source of tax-related information.

D. Data and Methodology

As in *Part I*, the data are drawn from the University of Michigan Tax Research Database. Although the panel contains data for 1979-1990, the health insurance deduction was only available to entrepreneurs following TRA86. In addition to an

indicator of whether a household claimed a health insurance deduction, the data also include the dollar amounts of these deductions for tax years 1987-1990.

I limit the analysis to sole proprietors as it is appropriate to focus on those eligible for the health insurance deduction and sole proprietors are more likely to meet this criterion than other possible measures of entrepreneurship. Sole proprietors are identified as those filers with a Schedule C.⁶⁴ This restriction also seems justified as results from recent research, utilizing the same data source, are remarkably consistent across entrepreneurship measures (Bruce and Holtz-Eakin 2001; *Part I*).

Figure 16 presents the percent of Schedule C filers reporting a health insurance deduction for years 1988-1990.⁶⁵ Overall, the percent of Schedule C filers claiming the deduction increased by 4 percentage points from just over 11 percent in 1988 to more than 15 percent in 1990. The average dollar value of deductions claimed also increased from \$427 to \$536 (Figure 17). As these values reflect at most 25 percent of the health insurance premiums paid, a conservative estimate for average premiums is \$1,708 to \$2,144.⁶⁶

In previous studies of entrepreneurial transitions, analyses have been conducted separately by marital status.⁶⁷ This is necessary as decision factors are likely to differ systematically by filing status. For instance, single filers are likely to be younger, have fewer dependants, and have larger variations in income. The necessity for separate analyses is compounded when considering the effects of health insurance as married

⁶⁴ Experimentation with other measures used in the literature (partnership, S corporation, or rent and royalty income) resulted in inadequate sample sizes.

⁶⁵ 1987 is not included due to insufficient sample size.

⁶⁶ The health insurance deduction could not exceed net profits.

⁶⁷ See Bruce and Holtz-Eakin (2001) and *Part I*.

filers potentially have access to health insurance through a spouse.

Use of the health insurance deduction and dollar amounts claimed are reported by marital status in Figures 16 and 17. In 1988 married filers were more likely to claim the deduction (11.14 percent) than single filers (10.70 percent). The growth in use from 1988-1990 for single filers outpaced that of married filers so that by the end of the three-year period single filers were slightly more likely to report a deduction (15.35 percent versus 14.92 percent).⁶⁸

Unsurprisingly, single filers had smaller deductions on average (Figure 17). In 1990 the average value of the deduction was 56.38 percent higher for married filers (\$610.24) than for single filers (\$344.05). This is likely because married filers have more dependents and are generally older and therefore pay higher premiums. Both groups of filers experienced an increase in the average value reported between 1988 and 1990 (28.07 percent for married filers and 24.66 percent for single filers). The increase for married filers primarily took place from 1988 to 1989 while single filers experienced higher growth in the average value of deductions from 1989 to 1990.

Entrepreneurial exit is defined as engaging in an entrepreneurial activity in one year (filing a Schedule C) and not the following year, as in *Part I*. This simple indicator avoids more complicated issues such as degree of entrepreneurship (e.g. percentage of total income derived from entrepreneurial activities) or whether a venture is risky enough to be considered entrepreneurial (e.g. those that exhibit substantial losses). Attempts to capture the most innovative or daring entrepreneurs by restricting the sample based on

⁶⁸ Health insurance deduction rates by filing status (single, married) are not statistically different at normal levels of significance.

income levels from entrepreneurship are complicated by the potential for losses. While those assuming the most risk are likely to have larger variations in income, large profits or losses do not necessarily indicate a truly innovative venture. This issue is further complicated by the presence of business related deductions including depreciation.

Table 14 contains suggestive evidence that health insurance deductions might decrease exit rates among Schedule C filers. The first entry in Table 14 indicates that 6.93 percent of Schedule C filers claiming a deduction in 1988 had exited entrepreneurship by 1989. The exit rate for those not claiming the deduction in 1988 was significantly higher at 19.65 percent. The pattern is similar across years and filing status.⁶⁹ A discrete choice framework is used to analyze the effects of health insurance deductibility on entrepreneurial exit as in *Part I*.⁷⁰

The estimated equation is of the form:

$$D_{i,t+1} = \beta'X_{i,t} + \tau T_{i,t+1} + \gamma H_{i,t} + \mu_i + v_{i,t+1}$$

where $D_{i,t+1}$ is a binary variable, which takes a value of 1 if an individual is engaged in an entrepreneurial activity as of time t and not engaged in an entrepreneurial activity as of time $t + 1$ and zero if the household remains in the entrepreneurship sector in both t and $t + 1$. $X_{i,t}$ is a vector containing a constant and a set of exogenous control variables as of time t . $T_{i,t+1}$ contains household level tax rates (entrepreneurial and wage and salary

⁶⁹ The small number of exits highlights the importance of going beyond simple indicators for health insurance deductions. Using the dollar value of deductions in multivariate models will provide greater variation for estimating the effects of health insurance deductibility.

⁷⁰ The lack a of longer panel of data (following the introduction of the health insurance deduction) precludes the use of more sophisticated duration analysis techniques to examine the effects of the health insurance deduction on *spells* of entrepreneurship.

income) as of time $t + 1$.⁷¹ $H_{i,t}$ contains information regarding the health insurance deduction at time t . In some of the models estimated below it is a dummy variable taking a value of one if the health insurance deduction was used. In other models it represents the dollar value of the health insurance deduction. The time t deduction amount is used to avoid potential endogeneity of the health insurance variable. Endogeneity is a concern as a household's employment sector affects its ability to claim the deduction.

The error term in this equation includes an individual-specific time-invariant random effect (μ_i), to capture unobserved individual heterogeneity, and an independently and identically distributed residual component ($v_{i,t+1}$) with zero mean and finite variance. The above equation is estimated via a random effects probit, as in *Part I*.⁷²

The ability to account for unobserved individual heterogeneity is particularly valuable given that the data set does not contain much in the way of demographic information. Education, race, and gender are among the missing variables for which there does not appear to be even a rough proxy. However, the panel of tax returns provides more in terms of additional control variables than might be immediately apparent. A discussion of the additional variables and their purpose for inclusion in the model can be found in *Part I, Chapter 6*.

⁷¹ Tax rates as of time $t+1$ are potentially endogenous as the chosen employment sector (wage and salary or self-employment) is likely to affect the observed tax rate. The instrumental variables approach used in *Part I* is also used to address tax rate endogeneity here.

⁷² 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 the sample in such a fashion. However, separate analyses are conducted for married and single households. In the case of a single filer, the household self-employment decision is equivalent to the individual decision.

E. Results

Baseline results are presented in Table 15. The top section contains results by marital status for the analysis using a dummy variable to indicate health insurance deductions. Models excluding the health insurance indicator are also reported for comparisons to previous literature. The first result of note is that the presence of a health insurance deduction reduces the probability of exit for both single and married filers.

I use marginal effects for the health insurance dummy variable to give the results in Table 15 more meaningful interpretation. The presence of a health insurance deduction decreases the probability of exit by 2.65 percentage points for single filers. Given that the overall probability of exit for single filers is 24.49⁷³ percent, this represents a reduction in the probability of exit of 10.82 percent. Modest increases in the dollar value of the deduction also result in similar reductions in the probability of exit for single filers. A 10 percent increase in the dollar value of the deduction (from an average of \$344.05 to \$378.46) reduces the probability of exit by 10.62 percent.

For married filers, the presence of a health insurance deduction reduces the probability of exit by 10.5 percentage points. This represents a large effect when compared with the average exit rate for married filers of 16.19 percent.⁷⁴ The elasticity of the probability of exit with respect to the dollar value of the health insurance deduction is much smaller for married filers (-0.12) than for single filers (-1.06). For married filers, a 10 percent increase in the average dollar value of the health insurance deduction (from \$610.24 to \$671.26) yields a 1.23 percent decrease in the probability of exit.

The bottom section of Table 15 contains results replacing the dummy variable for

⁷³ See Appendix Table 3.

⁷⁴ See Appendix Table 3.

a health insurance deduction with the dollar amount claimed. This specification allows for more variation in the health insurance variable. Results are consistent with the above and indicate that the probability of exit decreases as the dollar value of the health insurance deduction increases.

Tax rates are also significant in determining exit; an increase in the relative tax rate in a wage job decreases exit whereas a relative increase in the entrepreneurial tax rate increases the probability of exit. These tax rate results are consistent with the findings in *Part I*.⁷⁵ To assess the possibility that the consistent tax rate results for the shorter panel are sensitive to the inclusion of the health dummy, models excluding the dummy variable for the presence of a health insurance deduction are also shown in Table 15. For both single and married filers, the coefficients on the wage and entrepreneurial marginal tax rates (among all other significant variables) are nearly identical and still statistically significant in the more parsimonious models.

Other significant results include lower probabilities of exit for married filers in the West, Midwest, and Northeast relative to the South. High-income households are also less likely to exit regardless of filing status. Filers with a mortgage interest deduction are more likely to exit, echoing the results from *Part I*. As noted earlier, the presence of a mortgage might indicate that households are closer to their borrowing capacity and more likely to be liquidity constrained.

As in *Part I*, an across the board tax *rate* cut of one percentage point would be expected to result in less exit than otherwise would have been observed (4.02 percentage points for married filers). Interestingly, the same effect could be achieved by increasing

⁷⁵ In *Part I*, I employ the same estimation techniques on a longer panel of tax return data.

the value of the health insurance deduction by approximately 80 percent. This suggests that increasing the allowable Federal income tax deduction from 25 percent in 1996 to 45 in 1998⁷⁶ could have had significant impacts on the survival of entrepreneurs. In fact, the results indicate that this increase would have been equivalent to a reduction of one percentage point in the marginal tax rates of married filers.

Taken together, the results indicate that entrepreneurs are sensitive to multiple aspects of the tax system, including relative tax rates and tax incentives targeted at health insurance. The consistently significant and large effects from the 25 percent health insurance deductibility in 1988-1990 suggest that allowing a health insurance deduction from the calculation of SECA taxes might also significantly enhance survival. Full deductibility (100 percent) of health insurance premiums from the SECA tax would represent an increase in the value of the health insurance deduction of about 15 percent.⁷⁷

F. Conclusions and Further Work

I find convincing and consistent evidence that health insurance deductibility from the calculation of income taxes enhances entrepreneurial survival. The presence of large behavioral responses from the 25 percent deductibility available from 1988-1990 provide suggestive evidence that further increases in deductibility to 100 percent in 2003 likely led to higher levels of entrepreneurship than otherwise would have been observed. In addition, the results imply that allowing the deduction of health insurance premiums when calculating SECA tax liabilities would also increase the longevity of entrepreneurial ventures.

⁷⁶ Note that there was an intermediate increase to 40 percent in 1997.

⁷⁷ Assuming that the taxpayer is below the SECA income cap (\$87,000).

More broadly, these results provide further evidence that changing other aspects of the tax code, beyond the tax rates which are most commonly studied, can potentially create significant behavioral responses. Updating this analysis with a longer, more current panel of tax data would be a useful exercise for future research. Additional areas for future research on the effects of taxes on entrepreneurship include exploring other tax incentives such as retirement savings plans, depreciation allowances and use of business deductions for larger vehicles including sport utility vehicles.

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Part IV
Conclusions

Results from the above analyses indicate that policies matter in entrepreneurial decisions. This convincing evidence provides a natural segue into the broader questions. First, what does the analysis say about differential tax treatment of different sectors of the economy? Second, should tax policy be the preferred instrument for promoting entrepreneurial activity? Finally, do the analyses provide any guidance on whether entrepreneurial activity should be promoted? Addressing these questions reveals the caution necessary in the application of the results to policy issues.

Before addressing the broader questions a summary of the findings is useful. *Part I* provides convincing evidence that marginal tax rates have important effects on decisions to enter or remain in entrepreneurial activity. Increases in marginal tax rates on wage income increase the probability of entry, enhance survival, and reduce the probability of exit. Increases in marginal tax rates on entrepreneurial income decrease the probability of entry, lead to shorter spells of entrepreneurial activity and increase the probability of exit. Additionally, the results indicate that equal-rate cuts in tax rates on both wage and entrepreneurship income would increase entrepreneurship by increasing entry and delaying exit. This result indicates that tax rate cuts need not be specifically targeted at entrepreneurs to achieve increases in entrepreneurial activity.

In *Part II*, I find convincing and consistent evidence that the presence of a health insurance deduction in calculating income taxes reduces the probability of exit from an entrepreneurial activity. Increases in the value of the deduction also lead to lower probabilities of exit. These results suggest that the 25 percent deductibility available from 1988 to 1990 and that further increases in deductibility to 100 percent in 2003 likely led to higher levels of entrepreneurship than otherwise would have been observed. In

addition, the results imply that allowing the deduction of health insurance premiums when calculating SECA tax liabilities would also increase the longevity of entrepreneurial ventures.

Interestingly, modest changes in the deductibility of health insurance premiums produce results similar to an across-the-board tax rate cut. An across the board tax *rate* cut of one percentage point would be expected to result in less exit than otherwise would have been observed (4.02 percentage points for married filers). This same reduction in the probability of exit could be achieved by increasing the value of the health insurance deduction by approximately 80 percent, suggesting that the increase in the allowable Federal income tax deduction from 25 percent in 1996 to 45 percent in 1998 could have had effects equivalent to a reduction of one percentage point in the marginal tax rates of married filers.⁷⁸

The first key point from a broader perspective is that these findings indicate that differential tax treatment creates economic distortions. In other words, households alter their behavior in response to relative tax advantages and disadvantages. From a policy perspective the consistency of the evidence on this point indicates that decisions to provide advantages/disadvantages through the tax system should be made with the knowledge that these policies are likely to alter levels of economic activity toward the more favored sector. For instance, the current treatment of health insurance premiums for wage and salary workers and the self-employed renders the self-employed relatively tax disadvantaged. Creating a more equal (or neutral) tax system, by allowing full

⁷⁸ Note that this represents a potential increase in the value of the deduction of 80 percent but the actual increase in the value of the health insurance deduction would have varied by household.

deductibility for households in both sectors, would increase entrepreneurial activity.

Tax policies affect entrepreneurial behavior, leading to the question of whether the tax system should be used to alter levels of entrepreneurial activity in the economy. It is true that the evidence presented above provides clear evidence that changes in tax policies (rates and health insurance deductibility) have predictable effects on entrepreneurship. However, the results do not address the effects of other potentially important tax policies such as the array of taxes at the state and local level and they do not provide any evidence in support or opposition to the contention that tax policies are an efficient way to alter entrepreneurial activity. Alternative policy options, such as direct payments to entrepreneurs or guaranteed funding, should be evaluated on criteria such as relative cost, equity consequences, and political feasibility.

Finally, the above analyses do not assess the accuracy of the conventional wisdom that there is a need for more entrepreneurial activity in the economy. Arguments in support of promoting entrepreneurship include positive externalities (the idea that innovations and ideas generated through entrepreneurship benefit those not directly involved in the entrepreneurial activity) and the failure of the financial market to provide adequate funding. If one accepts these arguments it is still not clear that providing general tax advantages would be better than a policy targeting research and development or providing loans for entrepreneurial ventures.

Where does this leave us? In summary, taxes matter in entrepreneurial decisions; tax policies that render entrepreneurial activity more tax advantageous lead to higher levels of entrepreneurship in the economy. Making the tax system more neutral removes some of the incentives that distort household decisions. However, the analyses do not

address broader questions of policy concern such as how much entrepreneurial activity is optimal and whether tax policy is the best way to alter entrepreneurial activity in the economy.

Appendices

Appendix A

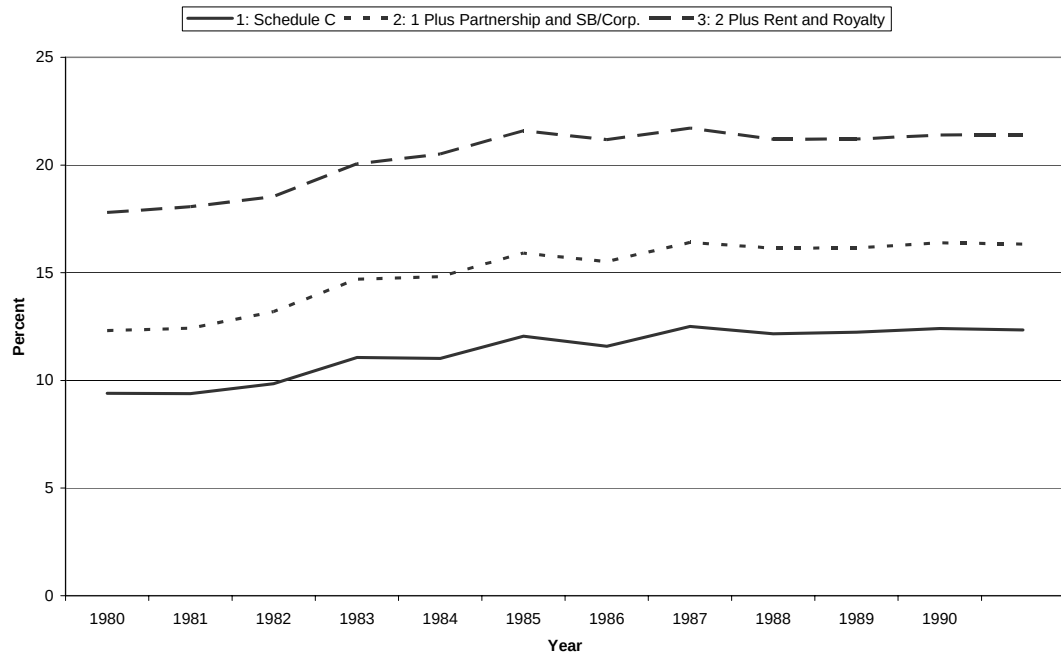


Figure 1: Entrepreneurship Rates by Category



Figure 2: Entrepreneurship Rates among the Unmarried



Figure 3: Entrepreneurship Rates among the Married



Figure 4: Entrepreneurial Entry

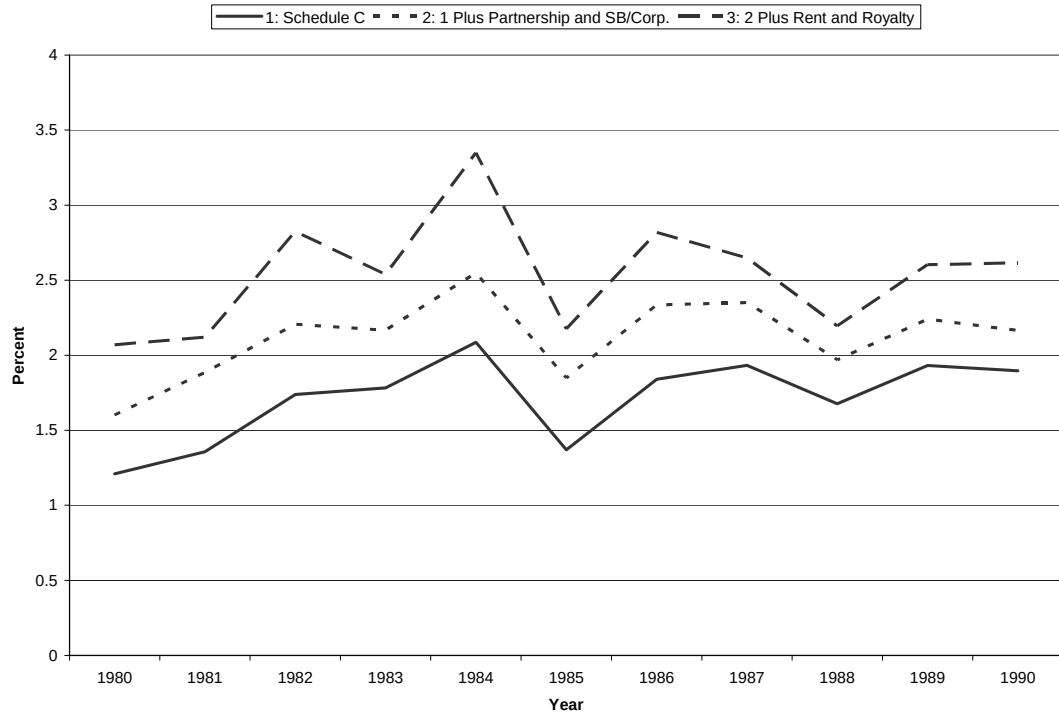


Figure 5: Entrepreneurial Entry among the Unmarried

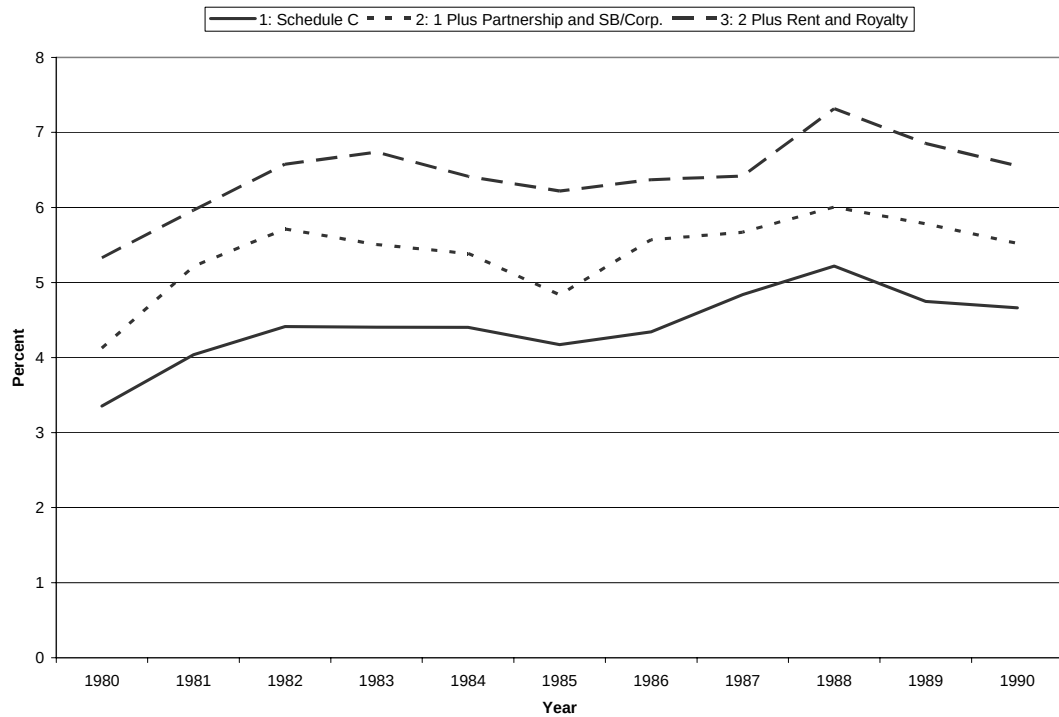


Figure 6: Entrepreneurial Entry among the Married



Figure 7: Entrepreneurial Exit



Figure 8: Entrepreneurial Exit among the Unmarried

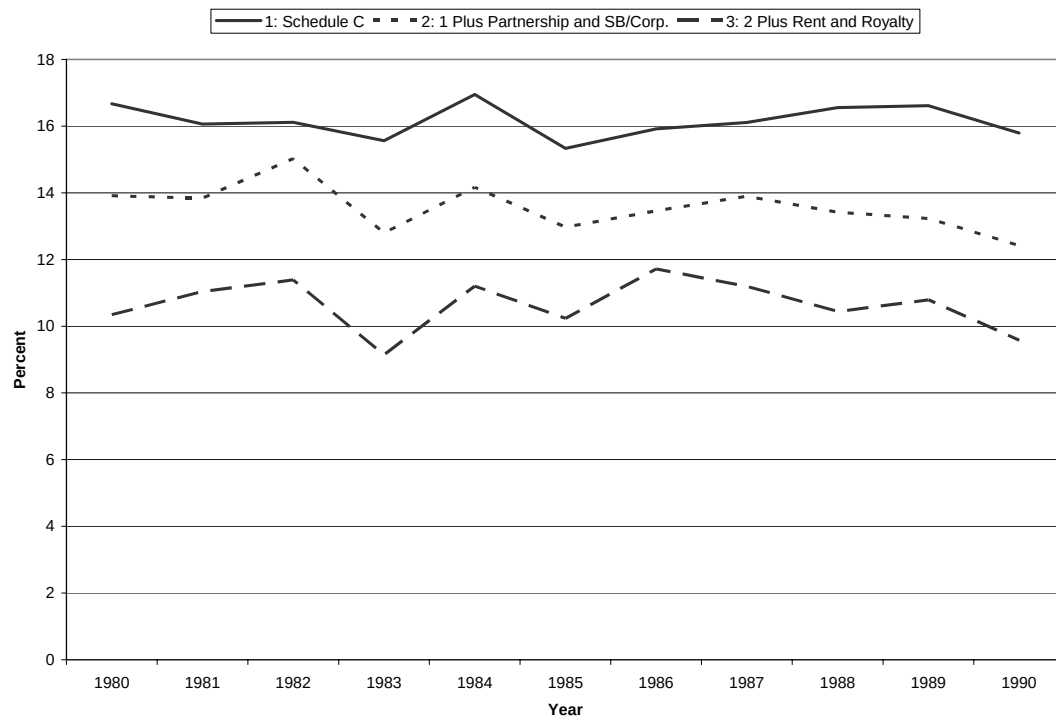


Figure 9: Entrepreneurial Exit among the Married

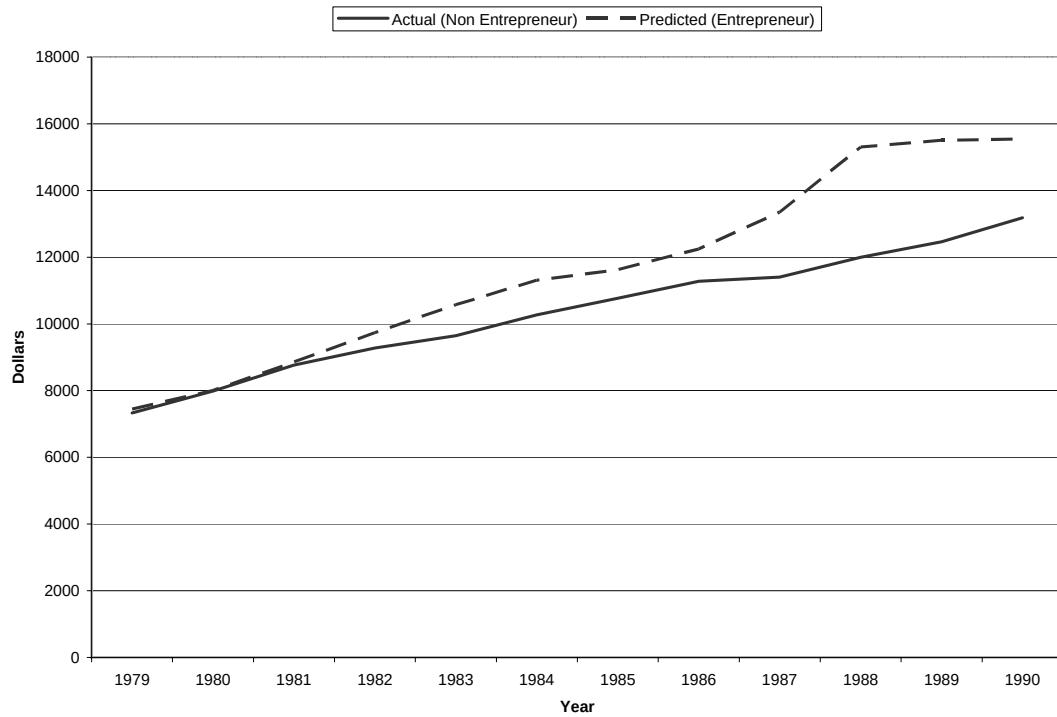


Figure 10: Observed Wage Income and Predictions for Single Filers



Figure 11: Observed Entrepreneurial Wage Income and Predictions for Single Filers



Figure 12: Observed Entrepreneurial Income and Predictions for Single Filers

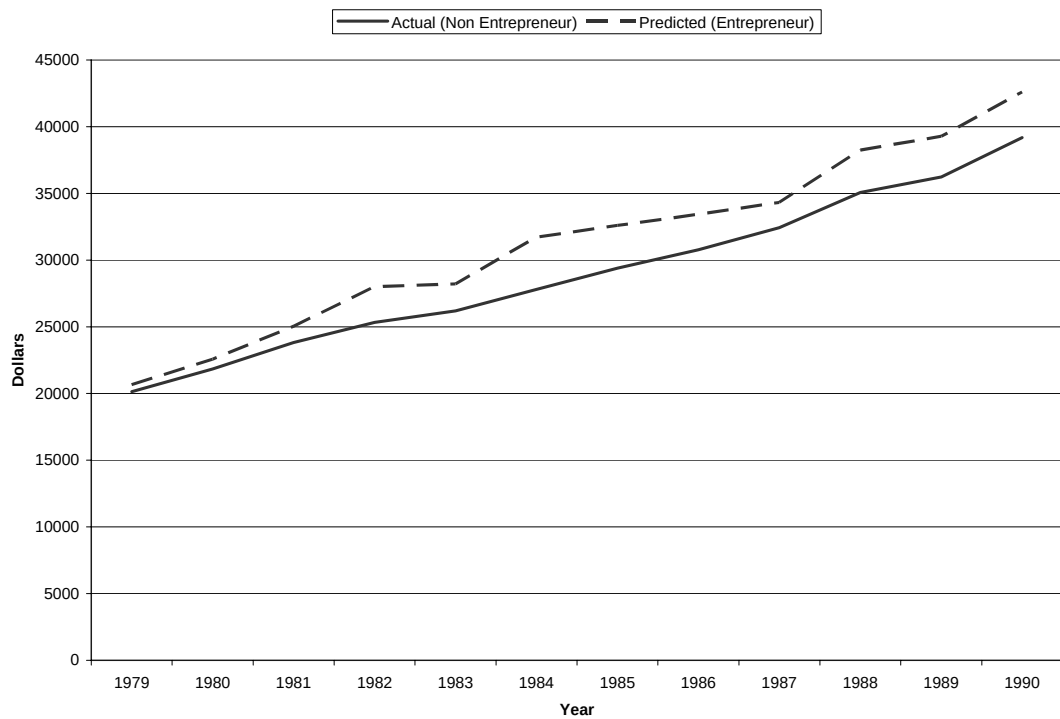


Figure 13: Observed Wage Income and Predictions for Married Filers



Figure 14: Observed Entrepreneurial Wage Income and Predictions for Married Filers



Figure 15: Observed Wage Income and Predictions for Married Filers

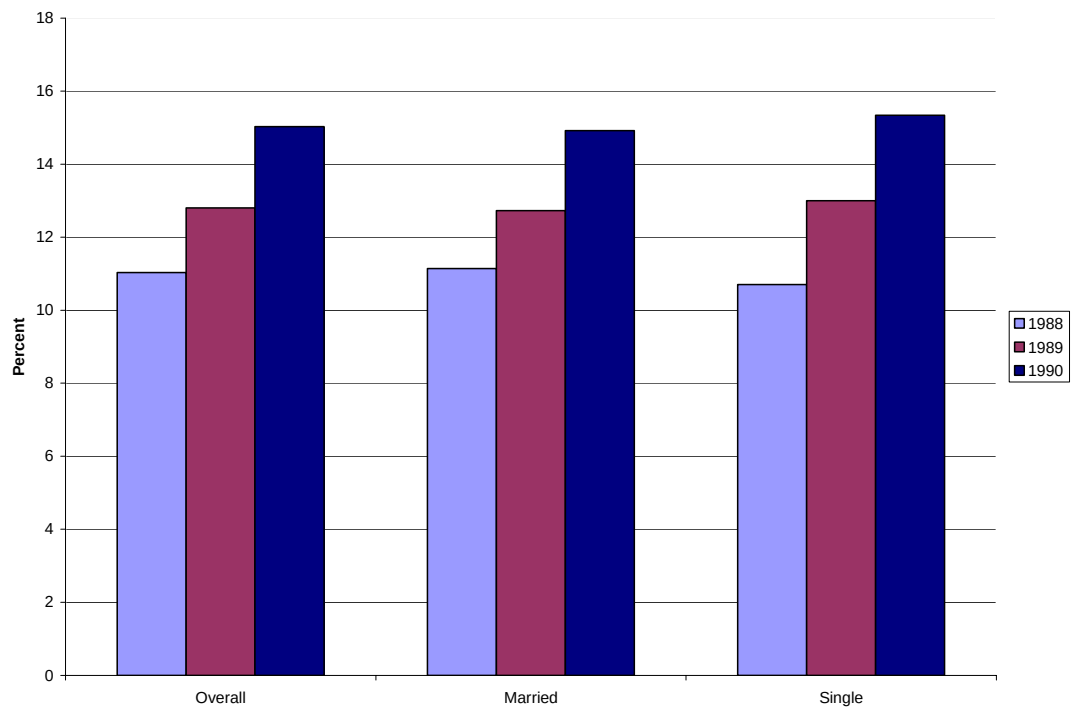


Figure 16: Percent of Schedule C Filers Claiming a Health Insurance Deduction

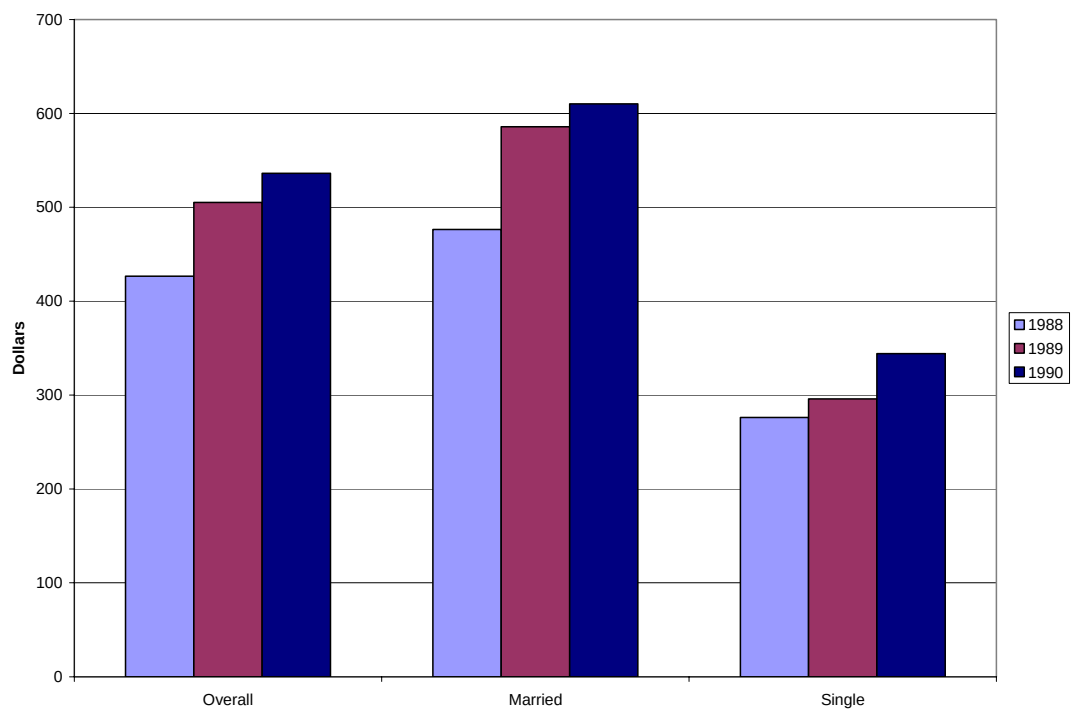


Figure 17: Dollar Value of Health Insurance Deductions Claimed by Schedule C Filers

Table 1: Tax Rates by Filing Status and Entrepreneurship Status

ENTRY		Marginal Tax Rates		Average Tax Rates	
		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

EXIT		Marginal Tax Rates		Average Tax Rates	
		Did Not Exit	Exited	Did Not Exit	Exited
Single	Wage TR	31.77	31.89	21.27	20.49
	Entrepreneurship TR	26.55	32.00	21.53	22.74
Married	Wage TR	36.83	35.94	17.23	15.77
	Entrepreneurship TR	31.56	33.87	14.67	17.07

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

	Entry				Exit			
	Single		Married		Single		Married	
	Mean	S.D.	Mean	S.D.	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				
Exit 1					0.233	0.423	0.162	0.369
Exit 2					0.197	0.398	0.135	0.342
Exit 3					0.154	0.361	0.106	0.308
Age 65	0.097	0.295	0.121	0.326	0.092	0.289	0.090	0.286
West	0.201	0.401	0.187	0.390	0.279	0.448	0.230	0.421
Midwest	0.248	0.432	0.260	0.438	0.223	0.416	0.250	0.433
Northeast	0.234	0.423	0.205	0.404	0.194	0.395	0.169	0.375
Other Region	0.005	0.072	0.007	0.081	0.003	0.050	0.001	0.038
Missing Region	0.001	0.028	0.005	0.073	0.006	0.076	0.010	0.099
Mortgage Interest Ded.	0.094	0.292	0.398	0.490	0.234	0.424	0.503	0.500
Kids Home	0.286	0.746	1.125	1.280	0.325	0.754	1.227	1.258
Kids Away	0.018	0.182	0.023	0.209	0.036	0.251	0.016	0.179
Total Exemptions	1.407	0.931	3.312	1.352	1.546	0.988	3.392	1.286
Balance Due (\$100)	-0.313	2.242	-0.349	9.579	0.305	8.056	0.440	10.654

Note: Means and standard deviations (S.D.) for all variables except entry and exit 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	0.020	0.000	0.001	0.212	0.014
Entrepreneurship MTR	-0.047	0.001	-0.469	0.016	-0.034	0.001	-0.668	0.020
Age 65	-0.283	0.051	0.479	0.089	-0.330	0.055	0.655	0.113
West	0.104	0.028	-0.285	0.040	0.183	0.028	-0.076	0.032
Midwest	-0.064	0.028	-0.446	0.037	0.083	0.026	-0.590	0.043
Northeast	0.067	0.029	0.463	0.048	0.058	0.030	0.855	0.058
Other Region	-0.830	0.229	-2.699	0.278	-0.841	0.192	-2.202	0.247
Missing Region	-0.118	0.469	2.280	0.490	0.966	0.144	1.875	0.152
Mortgage Interest Ded.	0.270	0.029	-1.019	0.070	0.251	0.021	-1.124	0.050
Kids Home	-0.114	0.032	0.169	0.051	0.085	0.026	-0.293	0.032
Kids Away	0.093	0.054	0.428	0.054	0.172	0.046	0.551	0.049
Total Exemptions	0.053	0.026	-0.053	0.041	-0.065	0.023	0.447	0.031
Balance Due (\$100)	0.045	0.006	0.058	0.006	0.003	0.001	0.044	0.002
Sample Size	89,490		78,726		89,490		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	0.020	0.002	0.001	0.184	0.014
Entrepreneurship MTR	-0.090	0.002	-0.366	0.011	-0.067	0.001	-0.267	0.006
Age 65	-0.436	0.064	-0.055	0.121	-0.504	0.056	-0.010	0.122
West	0.124	0.037	-0.083	0.047	0.205	0.029	0.215	0.033
Midwest	-0.066	0.036	-0.378	0.046	0.114	0.027	-0.038	0.043
Northeast	0.026	0.038	-0.062	0.053	0.076	0.030	0.154	0.047
Other Region	-1.259	0.273	-1.555	0.255	-0.692	0.194	0.154	0.177
Missing Region	-1.044	0.726	2.017	0.745	0.908	0.192	1.807	0.199
Mortgage Interest Ded.	0.334	0.039	-0.987	0.077	0.205	0.022	-0.532	0.044
Kids Home	-0.141	0.042	0.286	0.060	0.102	0.026	0.204	0.031
Kids Away	0.073	0.073	0.278	0.074	0.255	0.048	0.424	0.050
Total Exemptions	0.025	0.033	-0.291	0.049	-0.090	0.024	-0.188	0.027
Balance Due (\$100)	0.063	0.007	0.049	0.008	0.006	0.002	0.001	0.003
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.

Bold type indicates statistical significance at the five percent level or better.

Table 5: Entrepreneurial Entry Analysis - Average Tax Rates

	Single					
	Measure 1		Measure 2		Measure 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wage ATR	0.067	0.007	0.155	0.015	0.251	0.018
Entrepreneurship ATR	3.034	0.117	7.791	0.287	0.188	0.019
Age 65	27.847	1.065	76.467	2.765	5.319	0.338
West	2.314	0.092	0.642	0.037	0.000	0.036
Midwest	-1.225	0.054	1.465	0.064	-0.141	0.036
Northeast	-6.893	0.261	-19.390	0.707	-0.728	0.055
Other Region	2.594	0.364	-1.906	0.258	-0.907	0.254
Missing Region	-15.933	0.693	-29.430	1.174	-1.538	0.706
Mortgage Interest Ded.	7.963	0.304	17.916	0.658	0.831	0.082
Kids Home	4.454	0.172	12.246	0.443	0.764	0.067
Kids Away	-2.658	0.118	-3.813	0.156	0.159	0.071
Total Exemptions	-1.462	0.062	-8.647	0.313	-0.475	0.045
Balance Due (\$100)	-0.001	0.004	0.011	0.006	0.047	0.007
Sample Size	91,381		89,412		85,766	

	Married					
	Measure 1		Measure 2		Measure 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wage ATR	-0.920	0.175	10.052	2.147	0.894	0.099
Entrepreneurship ATR	1.303	0.119	1.063	0.103	-48.714	4.716
Age 65	0.571	1.565	91.173	18.117	-292.454	29.027
West	0.085	0.036	1.509	0.300	-18.976	1.866
Midwest	-0.171	0.243	-13.893	2.730	39.137	3.903
Northeast	-0.962	0.378	-20.022	3.738	75.119	7.441
Other Region	1.204	0.366	-10.798	1.648	31.896	3.201
Missing Region	-5.762	1.001	-57.866	11.151	268.387	26.410
Mortgage Interest Ded.	3.934	0.473	-21.023	4.755	-53.549	5.033
Kids Home	0.377	0.065	2.981	0.589	17.987	1.712
Kids Away	-0.375	0.084	-3.053	0.491	50.758	4.916
Total Exemptions	-0.390	0.037	1.131	0.244	-23.573	2.286
Balance Due (\$100)	-0.002	0.002	-0.053	0.010	0.392	0.038
Sample Size	83,965		78,695		71,239	

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. All tax rates are fitted values from first-stage instrumental variables regressions. ATR = Average Tax Rate.
Bold type indicates statistical significance at the five percent level or better.

Table 6: 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

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. See text for additional details. **Bold type** indicates statistical significance at the five percent level or better.

Table 7: Entrepreneurial Survival Analysis - Preliminary Statistics**SINGLE****Total Number of Spells = 184****Total Number of Exits = 142**

Year	At Risk	Exits	Kaplan-Meier	
			Right Censored	Survivor Function
1	184	57	127	69.0%
2	169	21	148	60.5%
3	162	10	152	56.7%
4	148	18	130	49.8%
5	133	10	123	46.1%
6	124	8	116	43.1%
7	107	7	100	40.3%
8	94	7	87	37.3%
9	82	1	81	36.8%
10	65	1	64	36.3%
11	48	2	46	34.8%

MARRIED**Total Number of Spells = 1,065****Total Number of Exits = 829**

Year	At Risk	Exits	Kaplan-Meier	
			Right Censored	Survivor Function
1	1,065	267	798	74.9%
2	1,024	143	881	64.5%
3	958	77	881	59.3%
4	912	79	833	54.2%
5	856	72	784	49.6%
6	798	45	753	46.8%
7	731	40	691	44.2%
8	662	37	625	41.8%
9	588	29	559	39.7%
10	507	24	483	37.8%
11	420	16	404	36.4%

Note: Entrepreneurship in this table is defined by the presence of a Schedule C (Measure 1).

Table 8: Baseline Entrepreneurial Survival Analysis

	Single		Married	
	Time Ratio	S.E.	Time Ratio	S.E.
Wage MTR	1.161	0.054	1.127	0.030
Entrepreneurship MTR	0.675	0.127	0.552	0.077
Age 65	2.204	1.865	0.100	0.070
West	0.593	0.170	2.260	0.449
Midwest	0.951	0.260	2.632	0.750
Northeast	1.151	0.506	5.227	2.255
Other Region	0.047	0.037	0.379	0.295
Missing Region	*	*	3.497	1.759
Mortgage Interest Ded.	0.346	0.172	0.367	0.063
Kids Home	1.453	0.842	0.723	0.108
Kids Away	1.407	0.785	1.137	0.298
Total Exemptions	0.957	0.544	1.362	0.202
Balance Due (\$100)	0.921	0.054	1.015	0.007
No. of subjects	184		1,065	
No. of exits	142		829	
Time at risk	1,316		8,521	

Notes: Entries are time ratios and robust standard errors from lognormal survival-time models. All models also include 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). MTR = Marginal Tax Rate.

*Variable dropped due to insufficient variation.

Bold type indicates statistical significance at the five percent level or better.

Table 9: Entrepreneurial Survival Analysis – Robustness Checks

		Single		Married	
		Time Ratio	S.E.	Time Ratio	S.E.
Baseline (for comparison)	Wage MTR	1.161	0.054	1.127	0.030
	Entrepreneurship MTR	0.675	0.127	0.552	0.077
Non-IV Marginal Tax Rates	Wage MTR	0.996	0.009	1.001	0.005
	Entrepreneurship MTR	0.967	0.009	0.993	0.004
IV Average Tax Rates	Wage ATR	0.852	0.114	*	*
	Entrepreneurship ATR	2.353	1.081	*	*
Non-IV Average Tax Rates	Wage ATR	1.010	0.009	1.012	0.006
	Entrepreneurship ATR	0.988	0.008	0.993	0.005

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. See text for additional details.
 * = Model would not converge.

Bold type indicates statistical significance at the five percent level or better.

Table 10: Baseline Entrepreneurial Exit 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	0.003	-0.334	0.074	-0.008	0.002	-0.193	0.022
Entrepreneurship MTR	0.039	0.003	0.632	0.228	0.015	0.001	0.380	0.141
Age 65	-0.865	0.163	-1.158	0.522	0.076	0.090	0.452	0.686
West	-0.250	0.097	0.806	0.325	-0.068	0.048	-0.343	0.186
Midwest	-0.195	0.102	-0.087	0.259	-0.052	0.047	-0.360	0.280
Northeast	-0.164	0.104	-0.613	0.465	-0.283	0.055	-0.931	0.407
Other Region	0.070	0.659	2.093	3.812	0.136	0.438	0.917	2.751
Missing Region	-0.707	0.506	-2.779	3.266	-0.230	0.182	-1.223	0.471
Mortgage Interest Ded.	-0.208	0.082	2.183	0.671	-0.024	0.035	0.869	0.169
Kids Home	-0.178	0.101	-0.735	0.305	0.007	0.046	0.035	0.113
Kids Away	-0.280	0.148	-0.777	0.389	0.019	0.096	-0.200	0.166
Total Exemptions	0.271	0.079	0.442	0.273	-0.001	0.043	-0.069	0.114
Balance Due (\$100)	0.003	0.004	-0.031	0.022	-0.002	0.002	-0.005	0.006
Sample Size	5,109		5,109		17,099		17,097	

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 11: Entrepreneurial Exit 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	-0.006	0.003	-0.355	0.024	-0.003	0.001	-0.249	0.012
Entrepreneurship MTR	0.041	0.003	0.750	0.084	0.022	0.001	0.488	0.047
Age 65	-0.593	0.137	-1.404	0.214	0.132	0.084	0.563	0.248
West	-0.305	0.094	0.218	0.096	-0.099	0.045	-0.523	0.081
Midwest	-0.151	0.098	0.383	0.100	-0.075	0.044	-0.426	0.104
Northeast	-0.178	0.100	-1.009	0.207	-0.302	0.051	-1.628	0.195
Other Region	0.323	0.714	2.110	0.707	-0.128	0.391	-0.168	0.405
Missing Region	-1.639	0.419	-3.741	0.504	-0.826	0.147	-1.347	0.164
Mortgage Interest Ded.	-0.314	0.076	1.599	0.152	-0.174	0.032	0.893	0.061
Kids Home	-0.105	0.099	-0.312	0.128	0.036	0.044	0.056	0.052
Kids Away	-0.373	0.146	-0.891	0.152	0.009	0.090	-0.289	0.094
Total Exemptions	0.223	0.076	0.186	0.115	-0.026	0.041	-0.095	0.048
Balance Due (\$100)	-0.018	0.006	-0.067	0.008	-0.003	0.002	-0.007	0.002
Sample Size	7,080		7,080		22,379		22,379	

Measure 3	Single				Married			
	Non-IV		IV		Non-IV		IV	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wage MTR	-0.022	0.002	-0.390	0.023	-0.009	0.001	-0.264	0.013
Entrepreneurship MTR	0.060	0.003	0.464	0.022	0.040	0.001	0.306	0.018
Age 65	-0.560	0.106	-0.749	0.177	0.124	0.081	-0.502	0.152
West	-0.234	0.083	0.100	0.098	-0.119	0.046	-0.165	0.057
Midwest	-0.039	0.083	0.467	0.099	-0.082	0.044	0.156	0.062
Northeast	-0.212	0.088	-0.013	0.107	-0.369	0.052	-0.568	0.082
Other Region	-0.072	0.561	2.275	0.600	-0.438	0.294	-0.413	0.402
Missing Region	-1.273	0.425	-3.306	0.473	-0.999	0.166	-1.736	0.189
Mortgage Interest Ded.	-0.426	0.069	1.463	0.114	-0.245	0.033	0.789	0.055
Kids Home	-0.034	0.088	-0.700	0.109	0.075	0.044	-0.135	0.051
Kids Away	-0.419	0.145	-0.702	0.155	0.071	0.088	-0.249	0.098
Total Exemptions	0.216	0.069	0.749	0.087	-0.058	0.041	0.120	0.048
Balance Due (\$100)	-0.004	0.005	-0.040	0.006	-0.004	0.002	-0.003	0.002
Sample Size	10,729		10,729		29,834		29,834	

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.

Bold type indicates statistical significance at the five percent level or better.

Table 12: Entrepreneurial Exit Analysis – Average Tax Rates

	Single					
	Measure 1		Measure 2		Measure 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wage ATR	-0.008	0.002	0.007	0.003	0.007	0.003
Entrepreneurship ATR	0.019	0.002	0.703	0.079	0.390	0.020
Age 65	-0.808	0.162	0.521	0.170	1.339	0.150
West	-0.257	0.096	-0.293	0.093	-0.478	0.098
Midwest	-0.162	0.102	-0.020	0.098	0.007	0.097
Northeast	-0.100	0.104	-1.630	0.199	-0.728	0.108
Other Region	-0.317	0.659	1.662	0.727	1.513	0.593
Missing Region	-0.636	0.504	-2.126	0.458	-1.758	0.472
Mortgage Interest Ded.	-0.190	0.082	0.634	0.123	0.299	0.084
Kids Home	-0.197	0.102	0.468	0.119	0.153	0.101
Kids Away	-0.209	0.147	-0.735	0.150	-0.527	0.159
Total Exemptions	0.283	0.079	-0.443	0.108	0.039	0.079
Balance Due (\$100)	0.005	0.003	-0.063	0.008	-0.029	0.006
Sample Size	5,104		7,080		10,729	

	Married					
	Measure 1		Measure 2		Measure 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wage ATR	-0.004	0.002	0.003	0.001	0.002	0.002
Entrepreneurship ATR	0.373	0.037	0.439	0.042	0.273	0.017
Age 65	1.995	0.208	2.323	0.216	1.516	0.119
West	-0.533	0.069	-0.708	0.075	-0.390	0.057
Midwest	-0.764	0.087	-0.924	0.094	-0.431	0.057
Northeast	-1.376	0.125	-2.059	0.177	-1.158	0.079
Other Region	1.260	0.459	0.415	0.395	0.180	0.398
Missing Region	-0.780	0.200	-1.240	0.159	-1.515	0.189
Mortgage Interest Ded.	0.334	0.048	0.221	0.046	0.059	0.040
Kids Home	0.197	0.051	0.219	0.048	0.045	0.049
Kids Away	-0.130	0.098	-0.219	0.092	-0.181	0.096
Total Exemptions	-0.205	0.048	-0.200	0.045	-0.007	0.045
Balance Due (\$100)	-0.007	0.002	-0.010	0.002	-0.007	0.002
Sample Size	17,098		22,379		29,834	

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. All Entrepreneurship tax rates except those for Single Measure 1 are fitted values from first-stage instrumental variables regressions. See text for additional details. ATR = Average Tax Rate. **Bold type** indicates statistical significance at the five percent level or better.

Table 13: Entrepreneurial Exit Analysis – Robustness Checks

		Single		Married	
		Coeff.	S.E.	Coeff.	S.E.
Baseline (for comparison)	Wage MTR	-0.334	0.025	-0.193	0.010
	Entrepreneurship MTR	0.632	0.073	0.380	0.039
MTR based on "other income"	Wage MTR	-0.334	0.025	-0.193	0.010
	Entrepreneurship MTR	0.512	0.059	0.338	0.034
Include only those whose filing status does not change	Wage MTR	-0.331	0.026	-0.197	0.010
	Entrepreneurship MTR	0.655	0.082	0.383	0.039
Include only those who are in the panel for the full twelve years	Wage MTR	-0.189	0.036	-0.180	0.014
	Entrepreneurship MTR	0.654	0.170	0.594	0.143
MTR Differential	Wage MTR - Entrep. MTR	-0.231	0.016	-0.154	0.007

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. See text for additional details. MTR = Marginal Tax Rate. **Bold type** indicates statistical significance at the five percent level or better.

**Table 14: Exit Rates for Schedule C Filers
by Previous Year's Health Insurance Deduction Status***

		All Schedule C Filers	Married Filers	Single Filers
1989 Exit Rates	Deduction	6.93% (19 / 274)	7.21% (15 / 208)	6.06% (4 / 66)
	No Deduction	19.65% (465 / 2,117)	17.85% (287 / 1,608)	25.34% (129 / 509)
	Overall	18.19% (435 / 2,391)	16.63% (302 / 1,816)	23.13% (133 / 575)
1990 Exit Rates	Deduction	8.05% (26 / 323)	5.96% (14 / 235)	13.64% (12 / 88)
	No Deduction	19.70% (425 / 2,157)	17.25% (279 / 1,617)	27.04% (146 / 540)
	Overall	18.19% (451 / 2,480)	15.82% (293 / 1,852)	25.16% (158 / 628)

Differences in exit rates by deduction status are statistically significant at the 1 percent level for each filing status group (all Schedule C, married, and single filers).

Table 15: Baseline Health Analysis
Dummy Variable for Health Insurance Deductibility

	<i>Single</i>				<i>Married</i>			
	<i>Coeff.</i>	<i>S.E.</i>	<i>Coeff.</i>	<i>S.E.</i>	<i>Coeff.</i>	<i>S.E.</i>	<i>Coeff.</i>	<i>S.E.</i>
Health Ins. Ded. (Dummy)	-1.139	0.407	--	--	-0.644	0.103	--	--
Wage MTR	-0.612	0.203	-0.619	0.165	-0.072	0.013	-0.071	0.013
Entrepreneurship MTR	0.697	0.192	0.745	0.208	0.257	0.058	0.260	0.060
Age 65	-2.593	1.480	-2.508	1.316	0.687	0.353	0.675	0.360
West	0.709	0.461	0.620	0.417	-0.354	0.105	-0.389	0.106
Midwest	0.262	0.539	0.113	0.485	-0.307	0.135	-0.342	0.138
Northeast	-0.277	0.677	-0.477	0.661	-0.689	0.191	-0.728	0.197
Other Region	4.595	1.988	4.872	2.030	-6.994	7.5E+06	-6.279	6.3E+05
Missing Region	-4.750	1.587	-4.637	1.304	-0.690	0.246	-0.779	0.248
Mortgage Interest Ded.	2.648	0.798	2.612	0.690	0.382	0.084	0.377	0.085
Kids Home	-0.413	0.596	-0.383	0.603	0.112	0.084	0.105	0.084
Kids Away	0.751	0.925	0.745	0.840	-0.789	0.490	-0.788	0.486
Total Exemptions	0.465	0.457	0.437	0.446	-0.111	0.080	-0.103	0.080
Balance Due (\$100)	-0.019	0.023	-0.029	0.024	-0.002	0.002	-0.003	0.002
Sample Size	1311		1311		3786		3786	

Bold type indicates statistical significance at the five percent level or better.

Table 15 (cont): Baseline Health Analysis
Dollar Amount of Health Insurance Deduction

	<i>Single</i>				<i>Married</i>			
	<i>Coeff.</i>	<i>S.E.</i>	<i>Coeff.</i>	<i>S.E.</i>	<i>Coeff.</i>	<i>S.E.</i>	<i>Coeff.</i>	<i>S.E.</i>
Health Ins. Dollar Amt. (\$100)	-0.863	0.239	--	--	-0.118	0.021	--	--
Wage MTR	-0.892	0.194	-0.619	0.165	-0.075	0.013	-0.071	0.013
Entrepreneurship MTR	0.677	0.176	0.745	0.208	0.257	0.058	0.260	0.060
Age 65	-3.899	1.337	-2.508	1.316	0.653	0.352	0.675	0.360
West	1.178	0.502	0.620	0.417	-0.362	0.105	-0.389	0.106
Midwest	0.770	0.496	0.113	0.485	-0.301	0.135	-0.342	0.138
Northeast	0.742	0.674	-0.477	0.661	-0.687	0.191	-0.728	0.197
Other Region	6.045	2.774	4.872	2.030	-7.372	3.3E+07	-6.962	7.5E+06
Missing Region	-7.397	1.893	-4.637	1.304	-0.706	0.246	-0.779	0.248
Mortgage Interest Ded.	3.403	0.768	2.612	0.690	0.395	0.084	0.377	0.085
Kids Home	-1.228	0.624	-0.383	0.603	0.107	0.084	0.105	0.084
Kids Away	1.102	0.882	0.745	0.840	-0.792	0.490	-0.788	0.486
Total Exemptions	1.096	0.487	0.437	0.446	-0.105	0.080	-0.103	0.080
Balance Due (\$100)	0.002	0.027	-0.029	0.024	-0.002	0.002	-0.003	0.002
Sample Size	1311		1311		3786		3786	

Bold type indicates statistical significance at the five percent level or better.

Appendix B

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 than 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).

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.

Table 3: Summary Statistics
Data Used in Part II Exit Analysis

	<i>Single</i>		<i>Married</i>	
	<i>Mean</i>	<i>Std.</i>	<i>Mean</i>	<i>Std.</i>
Exit*	0.245	0.430	0.162	0.368
Health Ins. Ded. (Dummy)	0.121	0.327	0.121	0.326
Health Ins. Dollar Amt. (\$100)	0.363	1.195	0.643	2.521
Wage MTR*	31.915	2.411	35.119	3.640
Entrepreneurship MTR*	33.424	1.935	33.595	2.530
Age 65	0.089	0.285	0.093	0.290
West	0.278	0.448	0.227	0.419
Midwest	0.204	0.403	0.248	0.432
Northeast	0.214	0.410	0.164	0.370
Other Region	0.002	0.000	0.000	0.016
Missing Region	0.014	0.116	0.020	0.139
Mortgage Interest Ded.	0.242	0.428	0.497	0.500
Kids Home	0.278	0.677	1.142	1.220
Kids Away	0.017	0.155	0.006	0.086
Total Exemptions	1.430	0.890	3.302	1.247
Balance Due (\$100)	0.462	4.822	0.962	17.340
Sample Size	1311		3786	

*Variables denoted with an asterisk are as of time $t + 1$, all other variables are as of time t .

Vita

Tami Jean Gurley was born in Denver, Colorado on September 14, 1978. She was raised on a wheat farm outside of Stratton, Colorado. Tami attended grade school, junior high school, and high school in Stratton, Colorado. She graduated from Stratton High School in 1997. Tami received her B.A. in economics and political science from the University of Colorado, Boulder in May 2000. After working for a year at the U of C Federal Credit Union, she returned to school at the University of Tennessee, Knoxville earning a M.A. in economics in December 2003 and a doctorate in economics in August 2005.