Tax Policy and Entrepreneurial Entry

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Many models of tax-policy evaluation abstract from decisions about entrepreneurship, such as entry, saving, and investment. Given recent emphasis on the significance of business ownership in explaining aggregate wealth accumulation and its distribution (see e.g., Gentry and Hubbard, 1999; Vincenzo Quadrini, 1999), such omissions are likely to be significant. In addition, entrepreneurs' decisions may account for much of the responsiveness of taxable income to changes in marginal tax rates.

We focus on impacts of tax rates and, in particular, tax progressivity on the decision to become an "entrepreneur." While recent research has examined effects of marginal tax rates on investment decisions of entrepreneurial households (Robert Carroll et al., 1997), analysis of effects of taxation on entry is less often pursued. While a proportional tax with a full loss offset will not affect the entry decision for a risk-neutral individual, a progressive schedule with imperfect loss offsets can discourage entry. We find substantial evidence for this effect on entrepreneurship using variation in tax schedules faced by households in the Panel Study on Income Dynamics (PSID) over the period from 1979 to 1992. While progressive taxation could in principle encourage entry via insurance for risk-averse entrepreneurs through the tax system or through offering greater incentive to avoid taxes on self-employment income, we find no evidence to support such channels. Our empirical results imply a significant increase in entrepreneurial entry when tax rates are less progressive; whether such encouragement is efficient (that is, stimulating the most talented entrepreneurs) is a topic for future research.

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I. Tax Policy and Entrepreneurial Selection

If rewards to entrepreneurship are more variable than rewards to work, and if loss offsets are imperfect, greater convexity of the tax schedule (as, for example, with an increase in progressivity) can discourage entrepreneurial activity by raising the average tax burden. Exploring such a channel requires a definition of "entrepreneurship"; we have elsewhere defined entrepreneurship as combining individual-specific ability with an up-front investment to generate an uncertain return (Gentry and Hubbard, 1999). Consider the following illustrative example of a risk-neutral individual i considering entrepreneurial entry at time t. If the individual works for a firm, he or she receives a certain wage $w_{it}(e_i, x_{it}, z_{it})$, where e, x, and z refer, respectively, to education, experience, and other household characteristics. Entrepreneurial ability is indexed by θ_i. With an investment of k, gross returns from entrepreneurship are given by $\theta_i k_{it}^{\alpha}$ if a project is successful, and gross returns are zero if the project is unsuccessful. Letting π_s represent the probability of success and r the gross risk-free interest rate, individual i's expected net return from entrepreneurship is given by

$$\pi_s(\theta_i k_{it}^{\alpha} - rk_{it}) - (1 - \pi_s)rk_{it}$$

or

$$\pi_s \theta_i k_{it}^{\alpha} - rk_{it}.$$

For entrepreneurial selection, individual i compares expected returns to entrepreneurship and employment, choosing entrepreneurship if

$$\pi_s \theta_i k_{it}^{\alpha} - rk_{it} > w_{it}(e_i, x_{it}, z_{it}).$$

In this simple discrete-choice example, a proportional tax with full loss offset has no effect on entrepreneurial selection. Consider, however, the case of a "success" tax at rate τ_s, which

exceeds the tax rate on wages τ for individual i, and an imperfect loss offset (in the failure state, the tax rate $\tau_f = \beta\tau_s$, $\beta < 1$). Entrepreneurial entry now occurs if

$$\pi_s\theta_i k_{it}^{\alpha} - rk_{it} > \left(\frac{1-\tau}{1-\tau_s}\right)w_{it} + \tau_s rk[(1-\beta)(1-\pi_s)].$$

Relative to the no-tax case, the likelihood of entrepreneurial entry is reduced the greater is the gap between τ_s and τ. In addition, the more imperfect the loss offset (i.e., the lower is β), the less likely is entrepreneurial entry.

A second channel through which the shape of the income-tax schedule may affect entrepreneurial decisions is through its effect on risk-taking by risk-averse potential entrepreneurs. Since Evsey Domar and Richard Musgrave (1944), public-finance economists have studied ways in which a proportional tax with full loss offset can affect risk-taking in a portfolio. When greater tax progressivity can offer insurance through the tax system against uninsured idiosyncratic risk, entry may be enhanced. The actual tax system, of course does not offer full loss offsets for entrepreneurs.

A third potential link between tax policy and entrepreneurial selection arises from tax-avoidance opportunities available through business ownership or self employment (see e.g., Roger Gordon, 1998). That is, in the context of our simple selection equation, effective tax rates on business activity can be less than those on employment, leading to higher rates of self-employment.

To summarize, links between tax policy and entrepreneurial entry because of insurance or tax avoidance predict a positive correlation between increases in income-tax progressivity and entrepreneurial entry probabilities, while models emphasizing a link between entrepreneurial talent and selection into entrepreneurship predict a negative correlation between increases in tax progressivity and entrepreneurial entry probabilities.

II. Empirical Analysis of Entry

To discriminate among potential effects of tax rates on entrepreneurial entry, one would like to have household-level panel data, with information on employment, entrepreneurial status, and investment, and sufficient information to estimate measures of income-tax convexity across households and time. For a household, the relevant convexity of the income tax depends upon provisions of the tax code and a description of the *ex ante* distribution of entrepreneurial outcomes. While households face a common tax code, they may have access to vastly different entrepreneurial opportunities.

While long panel data are available for U.S. households in the PSID, those data do not record entrepreneurial capital investment. As a result, we use self-employment of the head of the household as an indicator of entrepreneurship. We use data over the period 1979–1992. For our sample, 3.1 percent of household heads enter self employment, with the remainder continuing to work for someone else (our sample conditions on working in consecutive years). Abstracting from tax considerations, we estimate probit models for entry into entrepreneurship (some self-employment activity), ENTRY, by the head of the household i at time $t + 1$:

$$(1) \qquad \text{ENTRY}_{i,t+1} = f(e_i, x_{it}, z_{it}, \gamma_t).$$

We approximate educational status with indicator variables for "less than high-school education," "some college," "college," and "some post-college education" (with the omitted category being a high-school education). To control for opportunity cost of working, we include the level and square of the head of household's labor earnings in year t. For z, we include the head's age (AGE and $[\text{AGE}]^2$); dummy variables for whether the head is nonwhite, female, single, a homeowner, and rural (not a resident in a Standard Metropolitan Statistical Area); and number of children. Finally, we include year dummies to capture trends in entry decisions or the effects of macroeconomic conditions. The first column of Table 1 provides summary statistics for the control variables.

To construct tax variables, we use the TAXSIM model of the National Bureau of Economic Research to process household demographic and income data through federal and state tax codes. The model returns federal and state income-tax payments and marginal income-tax rates;

TABLE 1—MARGINAL EFFECTS FROM ENTRY PROBITS INTO SELF-EMPLOYMENT

Variable	(i) Mean [SD]	(ii) Less convex, mar. tax rate	(iii) More convex, mar tax rate	(iv) Less convex, ave tax rate
Tax rate on employment	(see notes)	−0.000183 (0 0000966)	−0.000144 (0.000096)	0.000455 (0.000138)
Convexity in tax rate (spread)	(see notes)	−0 000522 (0 0000667)	−0.000552 (0.0000491)	−0 00619 (0 000299)
Head's labor earnings	23468.34 [16902.92]	−3 00 (0.806)	−3.03 (0.796)	0 289 (0 836)
Head's labor earnings-squared		1.04 (0 220)	1 02 (0 218)	0.108 (0.239)
Age	36.99 [10 24]	0.000559 (0.000606)	0.000413 (0.000602)	0.000335 (0 000571)
Age-squared		−6.56 (7.70)	−4 78 (7 63)	−4 39 (7 23)
Minority	0.365 [0.481]	−0 0136 (0 00160)	−0.0133 (0.00159)	−0 0134 (0 00150)
Female head	0 205 [0.404]	−0 0197 (0.00180)	−0.0173 (0.00476)	−0.0172 (0.00176)
Single	0.363 [0.481]	0.00644 (0 00232)	0.00677 (0.00231)	0.0109 (0.00227)
Number of kids	1 13 [1.23]	0.00131 (0.000720)	0.00181 (0.000715)	0.00271 (0.000717)
Homeowner	0.547 [0.498]	−0 00515 (0 00186)	−0.00546 (0 00185)	−0 00591 (0.00176)
Rural	0.366 [0.482]	0.00128 (0.00162)	0 00119 (0.00160)	0 00125 (0.00152)
Less than high school	0.200 [0.400]	0.00517 (0.00236)	0.00542 (0.00235)	0.00475 (0 00223)
Some college	0.205 [0.404]	0 00999 (0 00242)	0.00953 (0.00239)	0.00879 (0.00227)
College	0.139 [0.345]	0.0136 (0.00306)	0.0132 (0.00302)	0.0114 (0.00284)
Some post-college education	0.0594 [0.236]	0.0183 (0.00486)	0.0173 (0.00476)	0.0129 (0.00430)
Pseudo-R^2		0 0249	0.0295	0.0529

Notes: Regressions [columns (ii)–(iv)] pool data from 1979 to 1992, include year effects, and have 48,007 observations; the table reports estimated marginal effects from probits, with standard errors in parentheses, for entry into self-employment. The sample includes households for which the head works for someone else in year t and is in the labor force in year $t + 1$, is between the ages 18 and 60, and has labor income in year t. Observations with average or marginal tax rates larger than 75 or smaller than −20 are dropped. The coefficients and standard errors for labor earnings are multiplied by 10^7, and those for labor earnings-squared are multiplied by 10^{12}. For age-squared, the coefficients and standard errors are multiplied by 10^6. For continuous variables, the marginal effects are evaluated at the mean values of the variables; for dummy variables, the marginal effects are for changes from 0 to 1. The means (standard deviations) of the tax variables are: marginal tax rate, 25.98 (10 80); marginal tax rate spread in the less convex case, 9.06 (9.81), marginal tax rate spread in the more convex case, 17.40 (14.87); average tax rate, 13.10 (8.64); and average tax rate spread in the less convex case, 6.51 (2.59).

we also construct average tax rates using family income. To construct the household's predicted marginal tax rate in year $t + 1$, we use household characteristics in year t and project the tax rate using the year-$(t + 1)$ tax code [results are not sensitive to constructing the tax measures with either the year-t or year-$(t + 2)$ tax code].

To approximate the convexity of the tax schedule faced by potential entrepreneurs, we make simple assumptions about the distribution of their possible outcomes as self-employed. We assume that the household will either be "successful" or "unsuccessful" as an entrepreneur. Our basic measure of convexity is the difference in marginal tax rates in the "successful" and "unsuccessful" states. We use two measures of the success spread that we label the "less convex" and "more convex" cases. The "less convex" case has a smaller income differential between being successful and unsuccessful, so it typically leads to a smaller spread in marginal tax rates. In the "successful" estimate, we replace the household head's labor income with 150 percent or 200 percent, respectively, of that labor-income number. In the "unsuccessful" estimate, we replace the household head's labor income with 75 percent or 50 percent, respectively, of that labor income. We then project "successful" and "unsuccessful" income and demographics into the $t + 1$ tax code to calculate the marginal tax rate spread. Implicitly, we link the distribution of entrepreneurial potential to opportunity cost as measured by current income.[1] Also, we assume that other types of income and demographics do not change with the decision to enter self-employment; for example, the wife's labor supply does not change upon the husband entering self-employment. Our calculation does not account for the imperfect loss offset for returns of capital, since we do not have data on investment by entrants.

To illustrate, consider a family with one child that lives in a state without a state

[1] Heterogeneity in observable characteristics does not appear to influence the estimated tax-spread effects presented here; separate specifications with richer controls for earnings or for samples of men, married men, or whites produce tax-spread effects qualitatively similar to those presented in Table 1.

income tax; assume that the husband earns $25,000 and the wife earns $15,000, both as employees. In the 1986 tax code, this family faced a marginal tax rate of 28 percent. In our less convex case, the husband would either earn $37,500 or $18,750 in self-employment, and the household's marginal tax rate would either rise to 33 percent or fall to 25 percent for a spread in marginal tax rates of 8 percentage points. In 1988, this family faced a marginal tax rate of 15 percent as employees but a spread of 13 percentage points between successful and unsuccessful entry. Alternatively, consider what happens to this family if the husband earns $90,000 and the wife earns $50,000. For the years 1986, 1988, 1992, and 1993, working as employees, this family would face marginal tax rates of 49, 33, 31, and 31 percent, respectively; however, the spread between successful and unsuccessful entry would be 5, 0, 2, and 7 percentage points, respectively. Comparing these two families reveals that convexity need not be positively correlated with the level of the tax rate.

The second and third columns of Table 1 report the results for the entry probits including the marginal tax rate on employment and the less convex and more convex measures of the convexity of the tax schedule, respectively. The entries in the columns are estimated marginal effects (and standard errors) from probits for entry into self employment. The patterns on the coefficients for the nontax variables are largely consistent with previous empirical studies of entrepreneurial selection (see e.g., Douglas Holtz-Eakin and Harvey S. Rosen, 1999). The coefficient on the marginal tax spread is negative and statistically significant. Thus, convexity in the tax system reduces the probability of entrepreneurial entry, all else being equal, consistent with our "success tax" story and inconsistent with an alternative in which more progressive taxation increases the likelihood of entrepreneurial risk-taking through entry. Comparing the two columns reveals that the results are not sensitive to the choice of the magnitude of the entrepreneurial venture.[2,3]

Moreover, the estimated effect of the convexity of the tax system on entry is economically important. For a household in which the husband earns $90,000 and the wife earns $50,000, the 1993 tax act increased the progressivity of the tax system without changing their marginal tax rate if they worked as employees. The coefficients in the third column predict that the increase in the spread in marginal tax rates from 2 percentage points to 7 percentage points between 1992 and 1993 would lower the probability of entering self-employment by 9 percent (from 2.89 percent to 2.63 percent).

This measure of convexity only accounts for differences in marginal tax rates at the specific income levels associated with successful and unsuccessful entry. It ignores convexity associated with changes in the marginal tax rate between these two income levels (which is relevant when the distribution of outcomes is continuous). It also does not account for convexity associated with lower marginal tax rates for income levels below the income associated with unsuccessful entry. The shape of the tax schedule below this income level may be important if the entrepreneur also invests capital without full loss offset. As an alternative measure of convexity, we replace our marginal tax-rate measures with average tax-rate measures. The level of the average tax rate replaces the marginal tax rate on being an employee; the spread between average tax rates for successful and unsuccessful entry replaces the marginal tax-rate measure of convexity.

The fourth column of Table 1 reports the results for replacing the marginal tax-rate measures of the tax system with average tax-rate

[2] Because part of the variation in the tax-rate variables reflects changes in the tax code over time, the estimated coefficients could be influenced by this variation to the extent that the year effects do not control completely for aggregate changes in entry probabilities. However, both the relationships between earnings and entry and those between the convexity measure and entry are relatively stable over time.

[3] Household assets or net worth may affect entry, all else being equal. The specifications reported in Table 1 do not include assets or net worth as explanatory variables because those data are not available on an annual basis in the PSID. If one includes dividend and interest income of the household (as a proxy for assets), its estimated effect on the likelihood of entry is positive, but its inclusion does not affect the estimate of the effect on entry of tax-rate convexity or its precision.

measures. Consistent with the two prior columns, the estimated coefficient on the convexity variable is negative and statistically significant. The coefficient on the average tax rate is positive, in contrast to the results using the level of the marginal tax rates. In addition, the inclusion of the average tax-rate measures changes the relationship between earnings and entry into self-employment, suggesting that the correlation between the average tax-rate measures and earnings affects the coefficients.

III. Conclusion

While most tax research focuses on the effects of marginal tax rates on behavior, our analysis indicates that the convexity of the tax system also affects behavior. Two extensions are particularly noteworthy. The first is to integrate tax-policy effects on entrepreneurial decisions in more general models of saving and investment. The second is to examine more precisely the efficiency consequences of tax effects on entrepreneurial entry. That is, to what extent do progressive marginal tax rates discourage entry by entrepreneurs with the most promising business projects?

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