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Taxes and Supply of Labor by Entrepreneurs

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ABSTRACT

We develop a model of entrepreneurship in which an individual allocates time between salaried work (which pays a certain income) and entrepreneurial activity (which yields an uncertain income). The individual pays taxes on both incomes; however we allow for deductibility of interest. We derive the effects of changing tax rates on the supply of labor to the salaried job market and the supply of labor to the entrepreneurial activity. We also investigate the effects of differential sectoral productivity and differing income tax rates on entrepreneurship.

Keywords: Entrepreneurship, Tax, Progressivity, Interest rates, Productivity.

INTRODUCTION

The importance of entrepreneurial activity in promoting growth has been recognized at least since Schumpeter [18] extolled the virtues of entrepreneurship and its concomitant, creative destruction. Entrepreneurial activity is inherently risky because of the likelihood of failure [13]. Individuals choosing to engage in entrepreneurial pursuits will take into account the probability of the activity's success as well as the returns in case of failure and success. They will also consider the returns from alternative uses of their time (income provided by a salaried job) and capital.

Rees and Shah [15] and Hamilton [10]examine the importance of earning differentials between entrepreneurship and wage employment. Black and Strahan [2]examine liquidity constraints associated with bank regulations. Cowling and Mitchell [5] study the determinants of the substantial rise in U.K. self-employment over the period 1972-1992 by considering macroeconomic conditions related to intergenerational human capital transfers.

The literature on taxes and self-employment focus on three main channels through which tax policies affect the employment decisions of entrepreneurs: (a) the tax incentive effects on labor supply and effort, (b) the tax evasion effect, (c) the risk reduction effect.

Stenkula [17]uses data from Sweden, a high-tax welfare state, to examine the impact of different taxes on self-employment. His work concludes that payroll taxes have a small negative effect on self-employment, but taxes on regular labor income and capital gains have no effect. Gentry & Hubbard [7]study the impacts of tax progressivity on the decision to become an entrepreneur. The emphasis is on entry. Their empirical analysis suggests a significant increase in entrepreneurial entry when personal income tax rates are less progressive. The argument is that under a progressive marginal tax rate, entrepreneurs are

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able to save less in taxes on any losses they incur while paying substantial taxes on any profits. Because more progressive tax schedules reduce the expected after-tax return from the project, it discourages risk-taking entrepreneurial activities. Baliamoune-Lutz & Garello [1]also examine the effect of tax progressivity on entry into entrepreneurship using data from a group of European countries. Their research concludesthat the effect of tax progressivity on entrepreneurship entry depends on the level of income. Tax progressivity discourages entry into entrepreneurship among those with high incomes but it seems to encourage entry when income is low-to-average.

Gurley-Calvez, & Bruce [9]examine the effect of taxes on the duration of entrepreneurial activity. They conclude that higher marginal tax rates on wage–labor increase the duration, while higher marginal tax rates on entrepreneur's labor shorten entrepreneurial spells; however, the relative magnitudes of these effects suggest that an across–the–board tax rate increase would reduce entrepreneurial longevity. Cullen & Gordon [6]examine how tax rates affect the amount of risk-taking observed among non-corporate (so presumably recent start-up) firms. Their study concludes that a cut in personal tax rates reduces entrepreneurial activity because it reduces the taxes saved from deducting business losses. Georgellis & Wall[8]investigate whether marginal income tax rates and bankruptcy exemptions influence rates of entrepreneurship. Using state-level panel dataset, they looked at the effects of changes in tax rates and bankruptcy exemptions and entrepreneurship over time and across states. They conclude that at low tax rates the relationship between marginal tax rates and entrepreneurship is negative and at high rates it is positive.

Bruce & Mohsin [3]include various taxes--federal income tax, payroll tax, capital gains tax, corporate income tax, and estate taxes--and evaluate their impact on entrepreneurship as defined for various purposes: IRS1: income from a business/profession; IRS2: income from partnership or corporation; BLS1: self-employed; BLS2: self-employed including agriculture. The study concludes that the top income tax rate has no significant effect on IRS-definition entrepreneurs, and a statistically significant, but very small, effect on BLS entrepreneurs (a 50 percentage point cut in the top income tax rate generates a 1 percentage point change in entrepreneurial activity.) The top capital gains and corporate income tax exert negative influence on all types of entrepreneurs. In general, the effect of tax policy on self-employment is quite small.

Carroll et al [4]consider the effect of entrepreneurs' personal income tax situation on their hiring decisions. They analyze the tax returns of sole proprietors before and after the Tax Reform Act of 1986 and conclude that an increase in the marginal tax rate had a negative impact on hiring as well as the median wage bills of entrepreneurs.

Data on self-employment from the U.S. Census' Current Population Survey (CPS) have been used widely in studies of entrepreneurial effort. In 2004, according to the CPS, there were about 13 million self-employed individuals, of whom more than two-thirds (or 8.8 million) were solely self-employed and the remaining (almost one-third) 4.1million were self-employed with paid jobs [12]. Another finding from the data is that those who were self-employed with paid jobs were on average better off than those who were self-employed without paid jobs as well as wage and salary earners. Thus, a large number of entrepreneurs also work in salaried jobs, and they also do better than other groups of workers. We include both these facets in the current paper. Engstrom, P., & Holmlund, B. [11], Pestieau, P., & Possen, U. M. [14], Robson & Wren [16] are some examples of studies that examine the tax evasion effect that arises when it is easier to evade or avoid taxes in self-employment than as a regular employee.

In this paper we examine further the link between tax rates and entrepreneurship. We develop a model of entrepreneurship in which an individual allocates time between a salaried job and entrepreneurial activity. In the event where the individual engages in entrepreneurial activity, the entrepreneur's income depends on labor supplied to the market, but also on the use of an input whose purchase is financed through borrowing. The tax system provides for interest deductibility—and the differential tax treatment affects the decision to engage in entrepreneurship. In the basic framework, we consider a single tax rate that applies to all incomeand examine the effect of taxes, interest rates, wages, productivity, and risk on entrepreneurial effort, measured by the joint allocation of labor and input to entrepreneurship activities.In an extension of the basic model, we consider the effects of progressive taxes.

The remainder of the paper is organized as follows. Section 2 describes the basic framework. Section 3 extends the model to include tax progressivity. Section 4 offers concluding remarks.

MODEL

We develop a framework of endogenous entrepreneurial activity. Consider an individual with a fixed endowment of time, set to unity. The individual divides her time between salaried work (*l*) and an entrepreneurial activity (*L*). The former yields a certain wage rate of *w*, leading to a before-tax income of *wl*. In addition to labor (time), the entrepreneurial activity also requires an input (*Z*) which can be bought for a price *p* per unit. The purchase of the input is financed by a loan of *pZ* at the beginning of the period. The loan is repaid at the end of the period with interest, with *r* denoting the interest rate on the loan.

Denote the output from the entrepreneurial venture by y_e. The production function is *Af(L,Z),* where *A* represents productivity, and *f(L,Z)* meets the usual conditions: it is concave, the marginal product of each input is positive and diminishing, and increased use of one input enhances the marginal product of the other. Thus,

$$f_1 > 0, f_2 > 0, f_{11} < 0, f_{22} < 0, f_{12} > 0, f_{11}f_{22} > f_{12}f_{21}.$$

Income from the entrepreneurial activity is uncertain. In case the activity is a success, the individual earns an income ofy_e; if the activity fails, the entrepreneurial income is zero. Denote the probability of success of the entrepreneurial activity by *q*; the probability of failure is (1-*q*). We set the price of the input at unity. Income is subject to taxes. The tax rate *t* applies to both salaried income as well as entrepreneurial income. Interest payments, however, are not subject to taxes.

In case of entrepreneurial success, total income before-tax is

$$w(1-L) + Af(L,Z) - (1+r)Z,$$

and after-tax income is

$$y_s = (1-t)[w(1-L) + Af(L,X) - rZ] - Z.$$

In case the entrepreneurial activity fails, total income before-tax is

$$w(1-L) - (1+r)Z,$$

and after-tax income is

$$y_f = (1-t)w(1-L) - (1-t)rZ - Z$$

The individual's expected income is given by

$$y = qy_s + (1-q)y_f,$$

which she seeks to maximize by choosing optimal values of *L* and Z.

The first-order conditions for a maximum income are

$qAf_1(L,Z) = w$, and

(2) $q(1-t)Af_2(L,Z) = 1 + (1-t)r$.

Equation (1) equates the expected return from an additional hour spent on the entrepreneurial activity to its opportunity cost. Equation (2) sets the expected marginal product of the entrepreneurial input equal to the cost of financing a unit it. From equations (1) and (2) we obtain the optimal values of *L* and Z (respectively denoted by *L** and *Z**) as functions of *t, w, q, r,* and *A*. Differentiating the equations totally we obtain

(3) $f_{11}dL + f_{12}dZ = \frac{dw - f_1(L^*,Z^*)qdA - f_1(L^*,Z^*)Adq}{qA}$, and

(4) $f_{21}dL + f_{22}dZ = \frac{-q(1-t)f_2(L^*,Z^*)dA - (1-t)Af_2(L^*,Z^*)dq + \{Aqf_2(L^*,Z^*) - r\}dt + (1-t)dr}{qA(1-t)}$

Let $J = f_{11}f_{22} - f_{12}f_{21} > 0$. From equations (3) and (4), we obtain the effects of changes in the parameters on the optimal values of *L* and *Z* as follows:

$$\frac{dL^*}{dw} = \frac{f_{22}/(qA)}{J} < 0, \qquad \frac{dZ^*}{dw} = \frac{-f_{12}/(qA)}{J} < 0,$$

$$\frac{dL^*}{dq} = \frac{(-f_1f_{22} + f_2f_{12})/q}{J} > 0, \qquad \frac{dZ^*}{dq} = \frac{(-f_{11}f_2 + f_{21}f_1)/q}{J} > 0$$

$$\frac{dL^*}{dr} = \frac{-f_{12}/(qA)}{J} < 0, \qquad \frac{dZ^*}{dr} = \frac{-f_{11}/(qA)}{J} < 0$$

$$\frac{dL^*}{dA} = \frac{(-f_1f_{22} + f_1f_{12})/A}{J} > 0, \qquad \frac{dZ^*}{dA} = \frac{(-f_{11}f_2 + f_{12}f_1)/A}{J} > 0$$

$$\frac{dL^*}{dt} = \frac{-f_{12}/(1-t)}{J} < 0, \qquad \frac{dZ^*}{dt} = \frac{-f_{11}(qA)}{J} < 0.$$

An increase in the wage rate makes salaried work more attractive causing individuals to spend less time and use a smaller amount of the input for the entrepreneurial activity. An increase in the probability of success of the entrepreneurial activity encourages such activity, while higher interest rates, by raising the cost of borrowing, discourages it.

An improvement in productivity in entrepreneurship, captured by an increase in *A*, raises the return to the activity and leads to greater investment of time and increased use of the input for entrepreneurship.

An increase in the income tax rate leads to reduced after-tax income from both salaried work and the entrepreneurial activity, but it results in less entrepreneurship and more time being devoted to the salaried job. The reason for this is apparent from an examination of equation (2): An increase in the tax rate causes the cost of borrowing to decline by a smaller amount than the expected marginal product of the input, leading to the use of a smaller amount of the input (and thereby also less labor) in the entrepreneurial activity.

The model yields differing effects of sectoral productivity on entrepreneurship. If the productivity gains occur in the salaried job market, wages will rise leading to a greater opportunity cost of entrepreneurship and reduced entrepreneurial activity. However, gains in

productivity in the entrepreneurial sector, reflected in an increase in *A*, will result in increased entrepreneurship.

TAX PROGRESSIVITY

We extend the model to study the effects of differing income tax rates on entrepreneurship. We incorporate a progressive tax system with two marginal tax rates t_0 and $t_1 (t_1 > t_0)$:

- If taxable income (*M*) is less than or equal to y_0, the tax paid is $t_0 M$.
- If taxable income (*M*) exceeds y_0, the tax paid is $t_0 y_0 + t_1 (m - y_0)$.

We assume that the taxable income generated in the case of entrepreneurial success exceeds y_0 while in case of entrepreneurial failure, it falls below y_0. This is in line with the finding in Lowrey [12] that entrepreneurs with salaried jobs earn higher incomes on average than wage and salary earners.

We consider two cases. In the first case the entrepreneurial activity succeeds, yielding a total taxable income of

$$Y_s = w(1 - L) + Af(L, Z) - rZ.$$

The tax is

$$t_0 y_0 + t_1 (Y_s - y_0),$$

and the individual earns an after-tax income of

$$y_s = (1 - t_1 [w(1 - L) + Af(L, Z) - rZ] + (t_1 - t_0) y_o.$$

In the second case, the entrepreneurial activity fails. Taxable income is

$$Y_f = w(1 - L) - rZ,$$

the tax is

$$t_0 Y_f,$$

and after-tax income is

$$y_f = (1 - t_0)[w(1 - L) - rZ - k.$$

The individual seeks to maximize expected after-tax income

$$y = q y_s + (1 - q) y_f$$

by choosing *L* and *k* optimally.

The first-order conditions for a maximum are:

(5) $q(1 - t_1)(Af_1(L, Z) - w) = (1 - q)(1 - t_0)w$, and

(6) $q(1 - t_1)(Af_2(L, Z) - r) = 1 + (1 - q)(1 - t_0)r.$

Equation (5) may be rearranged to yield

(7) $q(1 - t_1)Af_1(L, Z) = (1 - q)(1 - t_0)w + q(1 - t_1)w,$

which indicates that at the optimal point, the expected after-tax benefit of an extra hour of labor supplied to entrepreneurship equals its opportunity cost, viz. the expected after-tax wage of an hour of salaried work.

Similarly, equation (6) equates the expected after-tax benefit of an additional unit of capital to the expected after-tax cost of borrowing.

Totally differentiating equations (5) and (6), and setting $J = f_{11}f_{22} - f_{12}f_{21} > 0$, we obtain the effects of changes in parameter values on the optimal values of L and Z (denoted L^* and Z^*) as follows:

$$\frac{dL^*}{dt_0} = \frac{(1-q)(rf_{11} - wf_{22})}{qAJ(1-t_1)} > 0,$$

$$\frac{dZ^*}{dt_0} = \frac{(1-q)(wf_{21} - rf_{11})}{qAJ(1-t_1)} > 0,$$

$$\frac{dL^*}{dt_1} = \frac{(Af_1 - w)f_{22} - (Af_2 - r)f_{12}}{AJ(1-t_1)} < 0,$$

$$\frac{dZ^*}{dt_1} = \frac{(Af_2 - r)f_{11} - (Af_1 - w)f_{21}}{AJ(1-t_1)} < 0,$$

Changes in t_0, and t_1, have different effects on entrepreneurship. An increase in t_0 leads to more entrepreneurship, but higher t_1 reduces it. To see the effect of an increase in t_0 on L^*, consider equation (7). Higher $t_0$leads to a reduction in the after-tax wage in the case of entrepreneurial failure, but leaves the after-tax wage in the case of entrepreneurial success unaltered (since the higher tax rate applies). The result is a decrease in the opportunity cost of an hour of entrepreneurship; L^* consequently rises.

Also, from equation (6), an increase in t_0 reduces the after-tax cost of borrowing in case of entrepreneurial failure while leaving the after-tax return in case of entrepreneurial success unchanged. The result is an increased use of borrowing and greater use of the entrepreneurial input.

An increase in $t_1$also reduces the opportunity cost of an hour of entrepreneurial activity [as seen in the RHS of equation (7)]; however, it reduces the expected after-tax marginal product of labor by a greater amount at the initial value of L^*. In order to restore equality in equation (7), $f_1$must rise, which requires that L^* must fall.

Moreover, an increase in t_1 reduces the after tax expected marginal product of the entrepreneurial input in case of success without decreasing the after-tax cost of borrowing in case of failure. The result is a decrease in the use of the input, and thus reduced entrepreneurship.

The effects of productivity on entrepreneurship are similar to those discussed in the preceding section: An increase in A causes an increase in entrepreneurship while higher productivity in the salaried job, which causes an increase in the wage rate, leads to less entrepreneurship.

By virtue of the assumptions about the production function made earlier, the second-order conditions for a maximum are satisfied.

CONCLUSIONS

The findings of this paper add to the growing literature on the microeconomic foundations of entrepreneurship. Using models of optimal choice of labor supply we obtain the division of labor between entrepreneurial activity and salaried work, and show how that is affected by changes in tax rates and productivity gains. A key element of the models is the tax treatment of the interest paid on debt used to finance an uncertain entrepreneurial venture.

In the base model we find that an increase in the tax rate leads to a decline in the net return to entrepreneurship. Consequently the individual chooses to devote less time to entrepreneurial activity and more to salaried work. The effects of productivity gains in the model depend on where those gains occur. An increase in productivity in the entrepreneurial sector causes a diversion of labor and capital in that direction; an increase in productivity in the salaried job sector causes the wage rate to go up leading to less entrepreneurship.

The productivity results are replicated in an extended model that includes tax progressivity. But introducing different marginal tax rates in the framework yields mixed results with respect to higher taxes. An increase in the highest marginal tax rate leads to less entrepreneurship, while an increase in the lowest tax rate encourages entrepreneurial activity.

The framework can be extended to include an intertemporal component. The probability of success of the entrepreneurial venture in this paper is exogenous; in a dynamic model, chances of succeeding in a period may depend on past entrepreneurial activity. Such a model may be used to trace out the effects of temporary and permanent tax changes on entrepreneurship.

Another avenue for further research is the analysis of growth. By including the evolution of the stock of entrepreneurship capital over time, the model can be used to trace out the dynamic effects of tax policy on the labor devoted to entrepreneurship.

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