Taxes and Entrepreneurship

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Presumption that there is too little entrepreneurship

- The two main policy responses have been patent protection and R&D subsidies
- Based in part on my experience some years ago working at Bell Laboratories, I am skeptical that either approach works all that well, leading to my interest in use of tax policies to stimulate entrepreneurship.

Drawbacks of Patents

- Patent protection leads to too little use of new technology, given monopoly pricing and licensing fees
- Patent applications expensive, as are law suits over patent infringements
- In part due to these costs, managers at Bell Labs generally preferred secrecy over patents
- But they felt forced to patent at least some new technologies for use in cross-licensing agreements, to lessen the threat of hold-ups from patents held by other firms.

Weaknesses of R&D subsidies

- The rub is defining R&D under the tax law
- At Bell Labs, the reported R&D on Federal forms covered roughly 7% of the budget at Bell Labs (R, rather than D).
- Hard to calibrate the definition in order to cover most innovative activity without also subsidizing non-innovative expenditures.

How can taxes be used to encourage entrepreneurship?

- Given the various problems faced with non-tax policies, valuable to explore other tools.
- Two key issues when designing tax interventions
  - What are the market failures that justify our presumption that there is too little entrepreneurial activity?
  - What are the observable characteristics of firms that face these market failures?

Definition of "entrepreneur activity"?

- Definition used in this paper: "Innovative activity pursued in a new firm"
  - Note: paper does not focus on innovative activity undertaken in existing firms
- The challenge here is that "innovative activity" is not directly observable, raising the question what indicators of innovative activity *are* observable.

Paper explores four different market failures

- Informational spillovers to other firms from new ideas
  - Implicit motivation for patents
- Spillover benefits to consumers
  - Consumer surplus arises whenever there is a downward sloping demand curve for a new product

Other market failures

- Lemons problems in the equity market
  - Entrepreneurial risks largely idiosyncratic, suggesting large gains from spreading these risks broadly across investors
  - But asymmetric information makes it hard to sell equity in a firm exploring a new technology/product
  - With more costly risk-bearing, there is less entrepreneurial activity.

Other market failures

- Lemons problems in the bond market
  - Entrepreneurial firms find it hard to borrow, given their high failure rate and given lemons problems
  - Implies that only the richer individuals among those with good ideas can afford to become entrepreneurs
  - Liquidity constraints also limit ambition of new projects.

Aim of paper

- Explore how tax provisions might best address each of these market failures in turn.
- Paper focuses on use of three different tax provisions
  - Separate tax rate on the profits of start-up firms
  - Separate effective tax rate on the losses in a start-up firm
  - Separate tax treatment of capital/labor expenses in a start-up firm

Key complication driving analysis

- Presume that entrepreneurial firms are only a (small) subset of start-up firms.
  - Informational spillovers minimal for most start-ups, e.g. for a new local Thai restaurant
  - Few start-ups generate an entirely new product
  - Lemons problems in the financial market likely much worse for those firms attempting to design, manufacture, and market a new product/technology, given the lack of past experience with this product

Observable attributes of entrepreneurial firms?

- By trying to design and produce a new product, entrepreneurial firms presumably face:
  - High start-up costs developing a prototype, and more so the more innovative the product
  - High uncertainty concerning the production costs/demand for this new product
- Our key assumptions: Only entrepreneurial firms
  - face initial losses
  - face risks

Outline of presentation

- Start with a model of occupational choice, and choice of degree of innovation in any start-up firm, but with no market failures
  - What is the optimal choice for the above tax rates in this setting?
- Examine how forecasted policies change when add in turn each of the above market failures

Initial model with no market failures

- Individuals choose among four different jobs
  - Work as an employee
  - Manage an existing firm
  - Manage a start-up firm that uses existing technology
  - Set up a new firm that first designs a new technology and then brings it to market
- The first three occupations each yield a given income (varying by individual), with no further choices.

Initial Model

- Decisions made by those running a start-up firm
  - Degree of innovation, σ_i, where a higher σ_i implies higher start-up costs, a higher expected return, but also more risk
    - If $\sigma_i > 0$, the firm is “entrepreneurial”
    - Otherwise the firm is using existing technology
  - Fraction of equity, s_i, to sell to outside investors
  - For simplicity, assume no unsecured borrowing feasible, but start by assuming the entrepreneur is able to personally finance any start-up costs.

Pre-tax payoffs to each option

- Employee: w_i
- Manager of an existing firm: η_i
- Manager of a non-entrepreneurial start-up firm: μ_i
- Entrepreneur:
  - First-period prototype design costs: $-\rho_i\sigma_i$
  - Second-period returns: $g(\sigma_i)\mu_i(1+\sigma_i\tilde{\varepsilon}_i)$>0, where $g(0)=1$, and where $\tilde{\varepsilon}_i$ is idiosyncratic with mean 0, variance 1

Possible tax provisions

- Except for start-up managers, all income taxed at a proportional rate t
- For start-ups,
  - Profits taxed at rate βt
  - Losses deductible subject to rate αt
  - Input costs subsidized at rate ω (ignored for now)

After-tax payoffs

- Employee: $(1-t)w_i$
- Manager of existing firm: $(1-t)\eta_i$
- Manager of start-up: $(1-\beta t)\mu_i$
- Entrepreneur:
  - First-period return: $-(1-\alpha t)\rho_i\sigma_i$
  - Second-period expected return: $R_i \equiv (1-\beta t)g(\sigma_i)\mu_i$
  - Risk premium: $-.5\theta_i {R_i}^2(1-s_i)^2{\sigma_i}^2$

Forecasted Behavior

- With well-functioning financial markets, entrepreneur chooses $s_i = 1$, implying full diversification of entrepreneurial risks
- The first-order condition for σ_i then implies that $(1 - \beta t) g_i' \mu_i = (1 - \alpha t) \rho_i$

Optimal policies when no market failures

- Objective function: Sum of (certainty equivalent) incomes of individuals plus government revenue, in an effort to preserve production efficiency
  - Implicitly adopt assumptions in Saez (2002) and Rothschild-Scheuer (2013) to justify this.
- Optimal policies: $\alpha = \beta = 1$
  - Optimal policies avoid production distortions by imposing a uniform tax on all source of income
  - No favoring of entrepreneurial (or start-up firms more broadly), in spite of innovations and all job "growth" occurring in start-up firms

Market failure #1: Information spillovers

- Key assumption: Informational spillovers valued at $e(g(\sigma_i) - 1)\mu_i$, with e assumed the same for all i.
  - Observe $g(\sigma_i)\mu_i$ but not μ_i, making such a Pigovian subsidy infeasible.
- First-order condition for σ_i ideally would be $(1 + e)$ $g_i'\mu_i = \rho_i$.
- Can replicate this first-order condition through choosing tax rates so that $(1 + e) = \frac{1-\beta t}{1-\alpha t}$
- Maintain $\beta = 1$ to avoid distorting choices of non-entrepreneurial firms, implying $\alpha > \beta = 1$.

Market failure #2: Consumer spillovers

- Assume that the extent of consumer spillovers is an increasing function of $(g(\sigma_i) - 1)\mu_i$
- Assume want to implement a subsidy of the form $\mathrm{e}(g(\sigma_i) - 1)\mu_i$
- As in the prior case, can do this by choosing α so that $(1 + e) = \frac{1-t}{1-\alpha t}$.

Market failure #3: Lemons problems in equity market

- Assume managerial skill, μ_i, unobservable, but (as before) other characteristics of the manager become observable in period 2.
- Paper derives a separating equilibrium where better managers signal their skill by agreeing to keep a larger fraction of the firm's shares
- Due to these lemons problems, risk is misallocated,
  - Imposes risk-bearing costs on entrepreneurs, leading to less innovation

First-best policy response

- If everything is observable, ideal would be to impose a surtax on $Y_i - EY_i$
  - No effect on decisions by non-entrepreneurial firms
  - Risk-bearing costs fall
- While ex-post income observable, though, expected income is not observable

Second-best policy response

- While cannot observe EY_i, can use input costs as a proxy for $\mathrm{E}Y_i$: More skilled managers employ more inputs
- Trade off distortion to input choice with risk-sharing benefits
- On net, forecast a higher tax rate on start-up firms but more generous deductions for input costs, so a high marginal tax rate and a narrow tax base!

Market failure #4: Problems in bond market

- Assume start-up costs are capped by personal assets
  - Individuals with low assets either avoid becoming an entrepreneur or take on a less ambitious project.
- Can relax constraints faced by entrepreneurs with low assets by raising α, thereby lowering after-tax start-up costs
- But this policy distorts σ_i for high asset entrepreneurs.
- To avoid distorting σ_i, conditional on entry, would need to maintain $\beta = \alpha$.
- But this discourages entry
- As with equity case, can lessen this distortion through a more generous tax treatment of inputs.

Summary

- With all four market failures, optimal policies involve a more generous tax treatment of tax losses.
  - Note: Latest U.S. tax reform shifted to a less generous treatment of tax losses.
- For some of the market failures, also want a compensating *increase* in the tax rate on profits of start-up firms combined with a more generous tax treatment of input costs in order to approximate the desired incentives for both entrepreneurial and non-entrepreneurial start-ups.

Summary

- Forecasted policies contrary in many ways to standard recommendations
  - In no setting does the model forecast a lower tax rate on profits for start-ups, contrary to much of the prior literature
  - In some settings, even forecasts a higher tax rate on profits for start-ups
  - In these settings, also forecast a narrower tax base (due to input subsidies)